REFERENCE FILE

Spreckels SUGAR BEET Bulletin

VOLUME VII 1943

ISSUED BY SPRECKELS SUGAR COMPANY . . . ESTABLISHED 1897

AGRICULTURAL DEPARTMENT SPRECKELS SUGAR COMPANY

Addresses and Telephone Numbers

NAME	TITLE	ADDRESS	TELEPHONE
J. E. Coke	*General Agriculturist*	*Two Pine Street, San Francisco*	*DOuglas 5600*

DISTRICT 1

SALINAS DISTRICT

C. L. Pioda	*Resident Manager*	*Spreckels Sugar Co., Spreckels*	*Salinas 7321*
G. P. Wright	*District Manager*	" " " "	" "
W. H. Paulsen	*Agricultural Superintendent*	" " " "	" "
C. E. Crane	*Agricultural Superintendent*	" " " "	" "
Ralph Lambdin	*Asst. Agr. Superintendent*	" " " "	" "
G. C. McCandless	*Field Superintendent*	" " " "	" "
Glen McDougall	*Field Superintendent*	" " " "	" "
W. B. Marcum	*Field Superintendent*	" " " "	" "
F. R. Behringer	*Labor Superintendent*	" " " "	" "
J. B. Larsen	*Field Superintendent*	*P. O. Box 87, King City*	*King City 72-F2*

DISTRICT 2

SACRAMENTO DISTRICT

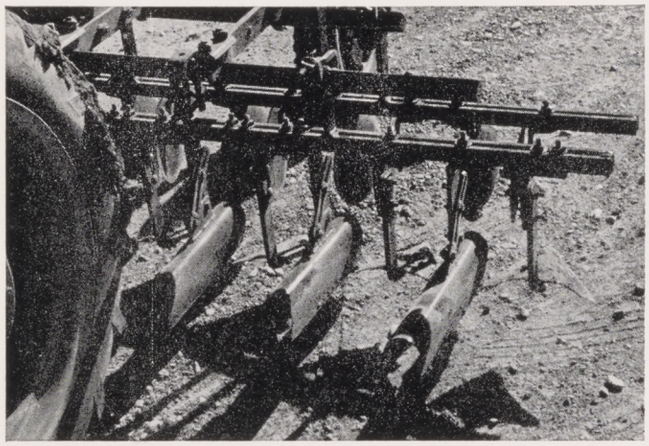
H. F. Melvin	*District Manager*	*Spreckels Sugar Co., 600 Calif. Fruit Bldg., Sacramento*	*3-2021*
W. C. Waterman	*Agricultural Superintendent*	" " " " " " " "	" " " "
A. L. Knudsen	*Labor Superintendent*	" " " " " " " "	" " " "
E. A. Schwing	*Entomologist*	" " " " " " " "	" " " "
P. T. Rezner	*Field Superintendent*	" " " " " " " "	" " " "
A. H. Kaas	*Field Superintendent*	" " " " " " " "	" " " "
Harold H. Voth	*Asst. Field Superintendent*	" " " " " " " "	" " " "
G. W. Zellinger	*Asst. Field Superintendent*	" " " " " " " "	" " " "
Wynne Rowlands	*Agricultural Clerk*	" " " " " " " "	" " " "
Dan Burr	*Field Superintendent*	*Spreckels Sugar Co., Walnut Grove*	*Walnut Grove 2646*
Guy D. Manuel	*Field Superintendent*	*Spreckels Sugar Co., Manteca*	*Manteca 42*
R. D. Jones	*Livestock Specialist*	*Spreckels Sugar Co., Woodland*	*Woodland 1060*
H. T. Carlson	*Asst. Agr. Superintendent*	" " " "	" "
J. C. Larsen Jr.	*Field Superintendent*	" " " "	" "
R. L. Merchant	*Field Superintendent*	" " " "	" "
H. J. Venning, Jr.	*Field Superintendent*	" " " "	" "
C. W. Patrie	*Field Superintendent*	" " " "	" "
R. T. Brownscombe	*Asst. Field Superintendent*	" " " "	" "

Spreckels SUGAR BEET Bulletin

PUBLISHED FOR CALIFORNIA SUGAR BEET GROWERS BY THE SPRECKELS SUGAR COMPANY

Vol. VII JANUARY 1943 No. 1

AN IDAHO CROSS-BLOCKER



The Self Manufacturing Company of Twin Falls, Idaho, has developed this equipment for cross-blocking sugar beets. The combination of discs, knives, and shields has made possible a very excellent job of mechanically blocking sugar beets in the Idaho territory.

REDUCE BEET POPULATION IN 1943

By CHAS. L. PIODA, *Resident Manager*
Spreckels Sugar Company

There are two important reasons why at this time spacing of beets in rows should be held to a maximum of between 100 and 110 beets per 100 feet.

The first is that because of the scarcity of labor the work of thinning, and topping and loading, should be planned to require the minimum effort on the part of the workmen. A stand of 100 beets per 100 feet of row will produce 26,136 beets per acre, while with a 120 per cent stand, there are 31,363 plants per acre. In topping these beets, the thicker stand requires 10,454 additional motions per acre; that is, there are 5,227 more beets to be picked up and topped than are necessary where the stand is 100 per cent, to say nothing of the extra loading involved. While it has been found that tonnage resulting from close thinning is somewhat increased, it is not proportionate to the increased number of beets left. With the thinner stand, beets have a tendency to grow somewhat larger due to the increased area from which each beet feeds. With fewer beets per ton to top and load, labor will be more content to work in beets, and growers will secure a larger output per man.

The second reason is because it now appears certain that a considerable portion of the 1943 crop will be harvested by mechanical aids, that is, a tractor-drawn topper, a plow, either separately or attached to the topper, and a loader consisting of a chain or belt conveyor covering a width of ten beds, upon which the beets will be placed by the workmen and elevated onto trucks. Here, too, the advantage of having beets of uniform size and spacing is obvious, and a thinned stand would lend itself to such harvesting better than when beets are thinned closer.

With a shortage of labor facing the country again next year, the slight sacrifice of the amount of sugar per acre involved in the wider spacing will be more than compensated for by the saving in costs of thinning and harvesting.

BEET SEED BAGS

New burlap for manufacture into sugar beet seed bags cannot now be purchased. It is, therefore, necessary to conserve the bags which are now in use.

Other materials may be found to replace burlap, but as yet no substitute materials have proven successful.

Last year the Spreckels Sugar Company attempted to secure from beet growers the return of empty beet seed bags by paying them the established ceiling price of 25 cents per bag. Securing the return of bags in this manner was only partially successful.

The present ceiling price established by the OPA which can be paid for unprocessed used beet seed bags is 22½ cents.

Because it is so important that the used bags be made available for reuse for beet seed, the Spreckels Sugar Company believes it desirable not to attempt to follow last year's procedure. The Company will retain title to all bags containing beet seed which are distributed to growers, but will make a deposit charge against the grower's account for such bags delivered. When the bags are returned, the grower's account will be credited for the total amount of the deposit charge.

For the large size bags used to issue whole beet seed, a deposit charge of $1.00 per bag will be made. It is planned to make segmented seed available in small burlap bags of closer weave and no deposit charge will be made for these.

Because of the emergency situation which exists, we know that growers will cooperate in returning in good condition all beet seed bags issued.

STEAM PLOWS PLAYED IMPORTANT PART IN EARLY BEET FARMING IN SPRECKELS DISTRICT

By CHAS. L. PIODA, *Resident Manager*
Spreckels Sugar Company, Spreckels, California

Much of the early development of the ranches of the Spreckels Sugar Company in the Spreckels District, both owned and leased, involved the extensive use of so-called "Steam Plows," or as the builders, Fowler and Company of Leeds, England, termed them, "Steam Tackles." A "Tackle" consisted of two separate mobile units, each composed of a boiler and engine mounted on wide-tired wheels, with a horizontal revolving drum suspended beneath the boiler, upon which was wound a 7/8-inch special steel wire cable 2100 feet long, the total weight of each unit being about 28 tons.

PHOTOGRAPH No. 1

The method of operation was for one engine to be stationed on each side of the field to be worked, at as great a distance apart as the length of the cable would permit. These engines pulled the implement used back and forth across the field, the cable of the pulling engine being attached to the front end, while the cable of the idle engine was fastened in such a manner as to drag it across the field and keep it clear of the implement itself. As soon as the full length of the cable had been reeled in by the pulling engine, or the edge of the field being worked was reached, the engineer immediately stopped the engine and released the cable drum, permitting the cable to unreel, while the other engine started a reeling in from its end, thus turning the implement around, or reversing its direction, as might be required.

The harrows and ring rollers which were hung beneath a wheeled frame and the plows, were pulled to and fro across the field, while most of the other implements were turned around before starting on the return trip.

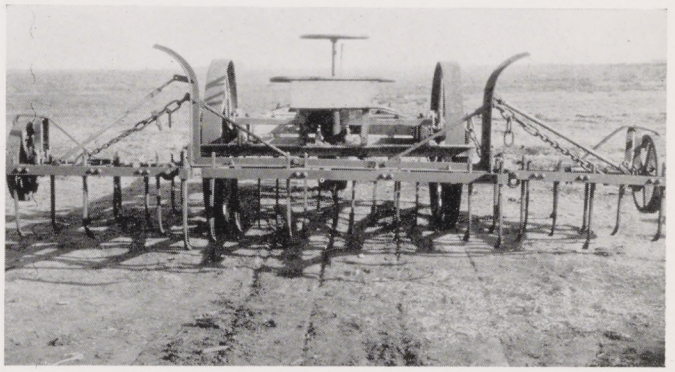
The plows were double-ended, unwieldy-looking affairs consisting of two triangular frames each with a complete set of plows mounted thereon, and hung on a central axle at an angle of about 25 per cent to the horizontal. When pulling, one gang of plows would be doing the work while the other stuck up in the air; when the end of the pull was reached the cable was hooked on the upstanding part, the pull of the other engine dragged it down and into the ground, thus raising up the other gang. Plows were equipped with right and left hand mould boards, thus giving the effect of a two-way plow. With the harrow frames, cables were attached to each end, thus enabling it to be pulled either way.

PHOTOGRAPH No. 2

The cultivators, beet lifters, etc., had to be turned completely around, and to accomplish this a triangular draw bar was pivoted to the frame so that when the implement was pulled ahead, the cable from the idle engine would be attached to the other arm of the draw bar at sufficient distance off center to drag the cable clear of the wheels. At the turning point, the pull of the other engine would drag the implement around without entangling the cable.

PHOTOGRAPH No. 3

The beet work done by the tackles usually consisted of about 12" plowing, or a double cultivation of 16 to 18 inches, followed by harrowing. If mellow enough the final work of preparation might be done by horses, of which the Company at one time had upward of 1300. If this was not possible, the tackles would wing-cultivate and ring-roll the land, leaving only the weed cutting and final harrowing to be done by teams. The beet lifting was done practically entirely by the tackles, as plowing out the beets in the hard dry soil of the southern ranches left the land in excellent shape for further working, and was almost impossible to do with horses.



3

Photo. No. 3. Wing cultivator.

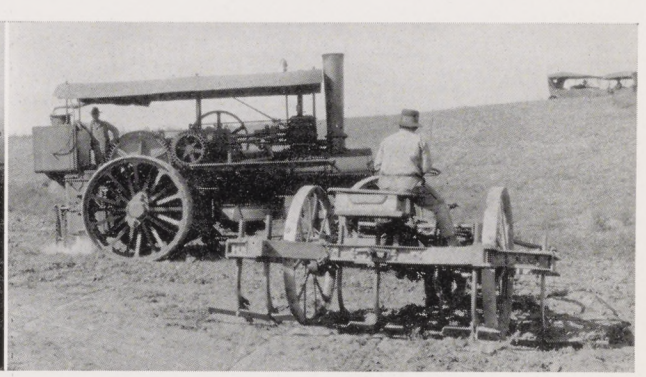
PHOTOGRAPH No. 4

The first two sets of tackles used by the Company were purchased by Mr. Claus Spreckels in 1897; one set was located at Ranch 1, Salinas, the other at Ranch 3, King City. They were first used in breaking up the hardpan that long years of shallow horse-plowing for grain had created. Owing to the lack of experienced help and the use of water of high mineral content in the boilers, they appeared at first to be a failure, in spite of numerous trials. However, Mr. R. H. Moore, who became General Manager of the Spreckels Sugar Company in 1905, had been in the Hawaiian Islands, and through his brother Andrew's experience was aware of the success that had followed the use of such tackles in the cane fields there. Originally designed to burn wood or coal, he converted them to oil burners, erected water-softeners to treat the water before using, imported a crew of experienced Portuguese operators from the island, and successfully set them to work.

While before whistles had signaled the stop and go of the cable, now no sound was heard. The instant one cable stopped, the other engine started, and with experienced men in charge, the work proceeded without hitch.

Eight sets or 16 engines were purchased over a ten-year period

Photo. No. 1. Beet lifting at Spreckels King City Ranch, showing Engine, Lifter, Water Wagon, Vic Bonito and his mule team. The second engine and oil wagon are not shown.



2

Photo. No. 2. Seven-tine deep cultivator.

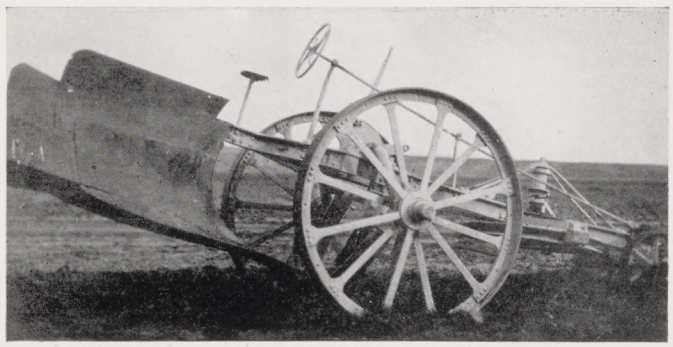
starting in 1907, at a cost of from $27,000 to $37,000 for each set. In the heyday of their usefulness they were all operating and doing work it would have been impossible to accomplish with either teams or round wheel tractors, but the successful development of the caterpillar tractor with its gas engine and track layer marked the beginning of the end of the usefulness of the steam plow. Even now the heaviest jobs that formerly were done with the tackles can be accomplished only by the caterpillar by doubling and trebling the power used, but the economy and flexibility of the latter, combined with the economy of the Diesel engines now used, makes competition out of the question.

4

Photo. No. 4. Discing. Note cable attached to frame.

PHOTOGRAPH No. 5

Operation of a set of steam plows was expensive and required considerable supplementary help. A full crew for one shift consisted of a foreman with team; two engineers; one to two implement men; one man and five horses for the water wagon; one man and two horses for oil and wood wagon; one cook and one helper. One man would start a fire under the boilers before daylight. By the time the engineers came on the job there was sufficient steam to start the oil, and it then took but a short time to get the steam up to 185 pounds, which was the normal pressure carried, although the boilers were built for 15 atmosphere. Boiler tubes had to be rolled frequently on account of the quality of the water. Cables were expensive and would wear out rapidly in certain lands. Once a year the engines and equipment were dismantled and overhauled completely.



5

Photo. No. 5. Steam plow ditcher.

PHOTOGRAPH No. 6

When the Spreckels Sugar Company abandoned its farming operations in 1927, ten of its 16 engines were brought into the factory yard at Spreckels. Efforts to sell them for use as tackles were unsuccessful and they were finally disposed of to be dismantled and sold for junk.

6

Photo. No. 6. The end of the trail. Ten engines in the Spreckels factory yard awaiting final disposition.

PARITY PRICE CHART DISCONTINUED

We are discontinuing the chart showing the monthly variation in the parity price of sugar beets. We do not consider the present parity concept for agricultural products as indicative of the farmers' position, because of the disproportionate rise in agricultural labor.

SOME CHEMICAL ASPECTS OF SOIL STRUCTURE

By E. M. HARTMANN, *Chief Chemist*
Spreckels Sugar Company at Spreckels

Most of the processes involved in the farmer's control of soil structure are primarily of mechanical rather than a chemical nature. Even liming and manuring have never been proved to have a direct chemical effect on soil structure except in the case of alkali soils.

However, the very existence of soil structure is dependent primarily on chemical processes which should be of interest to anyone concerned with the soil. Let us consider the makeup of the average soil and see what would happen if we tried to reproduce it from chemically inactive materials. The average soil consists of a liquid phase (the soil solution) and a solid phase ranging in particle size from rocks and gravel through sand and silt to sub-microscopic or colloidal clay particles. If we were to mix up a synthetic soil from, let us say, glass balls of the same size range as the solid phase of the soil, we would end up with the worst possible type of soil structure. The silt-size balls would fill the spaces or voids between the sand-size balls, the larger clay-size balls would fill the voids between the silt-size balls, and the sub-microscopic balls would fill the remaining voids. The voids between the latter particles would be so small that water and air would pass through them about as easily as thick glue will pass through the eye of a needle. Thus we would have an impermeable mass comparable in consistency to the worst imaginable black alkali soil condition.

It is, therefore, evident that the presence of a usable soil structure is dependent on accumulating many of the small particles and uniting them together into aggregates.

(Continued on page 4)

CHEMICAL ASPECTS *(Continued from page 3)*

Once this is accomplished, effects dependent on weather, plant growth, and tillage operations will form pores through which water and air can move freely, so that plants can feed.

Soil aggregates are formed by two chemical processes, namely, flocculation of the colloidal particles, and cementation under pressure. Flocculation is thoroughly understood in the field of colloid chemistry. Colloids are particles of matter larger than molecules, but generally too small to be visible in the optical microscope. They characteristically bear an electric charge, the cause of which need not concern us. All the particles of a given colloid bear charges of the same sign, so that they tend to repel each other by the well-known law that like charges repel while unlike charges attract. If we reduce a water-insoluble substance to colloidal size and disperse it in water, the particles will be kicked around by the continually moving water molecules with a degree of energy which, due to the small size of the particles, exceeds the effect of gravity. The particles are prevented from accumulating to form larger particles by their repellent electrical charges. Thus, they do not settle out and we have an apparent solution. However, if the charge on the particles is reduced sufficiently, they will collide and lump together into large particles which are quickly pulled down by gravity, and the colloidal solution no longer exists. This is what is known as flocculation. The accumulated colloidal particles are called flocs. Flocculation of the minute colloidal clay particles in the soil is the first stage in producing a usable soil structure.

Evidently the way to promote flocculation is to reduce the electrical charge on the colloidal particles. This is done by neutralizing it with charges of opposite sign. These opposing charges may be provided by adding inorganic salts to the solution surrounding the colloid particles, because all inorganic salts in water solution split up into ions which bear electrical charges. The colloidal particle will attract to itself those ions which bear the opposite charge; and some of these ions will actually cling to the particle and thus neutralize part of its electrical potential. The more ions of opposite charge a colloidal particle has clinging to (or absorbed on) it, the less effective is its repellent force on its neighbor and consequently the nearer it is to joining up with its neighbors to form larger particles or flocs.

It happens that each different type of ion has a different tendency to adsorb on colloidal particles. Thus, if we wish to flocculate a colloid we have a choice of two methods. Either we can create a high salt concentration in the solution, which will make available a lot of ions to adsorb on the colloidal particles; or we can add a smaller amount of a particular salt which provides ions having a stronger tendency to adsorb on the particles. In dealing with soils, the latter method is generally used, since the former involves high salt concentrations which are subject to loss by leaching and tend to injure plant life.

We therefore wish to know what ions are easily adsorbed on soil colloids. Since soil colloids are negatively charged, we are concerned with positively charged, or metallic, ions. Following is a list of the more common metallic ions grouped in order of increasing adsorptive power:

1. NH_4^+ (Ammonium)
2. Na^+ (Sodium)
3. K^+ (Potassium)
4. Mg^{++} (Magnesium)
5. Ca^{++} (Calcium)
6. Al^{+++} (Aluminum)
7. Fe^{+++} (Iron)
8. H^+ (Hydrogen)

Thus if we wish to flocculate a negative colloid we shall add compounds containing ions which fall near the bottom of the list, those which are adsorbed most strongly.

The permeability of a given clay soil has been shown by Lutz (*Mo. Agr. Exp. Sta. Res. Bul.* 212, 1934) to vary directly with the above series depending on which of the ions is adsorbed by the clay. This proves that our principle is directly applicable to the problem of soil structure.

The reason for the poor structure of alkali soils and for the use of lime in their reclamation is now apparent. Alkali soils are rich in sodium which (as shown by its position on the list) is only weakly adsorbed. The colloidal clay particles, therefore, have a high electrical charge and thus are very highly dispersed. If we add lime to such a soil, the calcium ions from the lime, being strongly adsorbed, drive the sodium ions out of the colloidal particles. The sodium is then removed by leaching. At the same time the calcium ions are adsorbed in greater numbers than were the sodium ions; and in this way they neutralize more of the charge on the particles and effect flocculation.

Hydrogen (acid) and magnesium soils, due to the higher adsorptive power of these ions, are likely to be well flocculated already, so that the addition of lime to these soils effects no direct improvement in soil structure. However, it may indirectly improve the structure through neutralization of an acid condition and subsequent improvement in plant growth; or through the preservation of organic matter. Iron and aluminum soils generally have excellent aggregate formation due to the high flocculating power of these ions and to the cementing power of some of their compounds, as we shall see presently.

Cementation of the soil particles into aggregates is due to the power of certain colloids to coagulate on drying in such a way that they redisperse but slowly or not at all when they are rewet. Such colloidal particles become more closely grouped on drying and develop between themselves chemical bonds, or bonds associated with their electrical charges. Thus a continuous solid or cement is produced. These bonds are loosened on rewetting with a degree of difficulty which determines the permanence of their cementing effect. Clays form a semi-permanent cement in this manner; while some organic soil colloids as well as iron and aluminum hydroxides form very permanent cements. It is evident that alternate wetting and drying of the soil is necessary to promote cementation.

Colloids are also largely responsible for soil pressure changes which aid cementation and separation of the granules. Pressure developed by colloids is due to the swelling and shrinking properties of some colloids on wetting and drying. This may be considered due to the particles changing their effective volume by adsorbing or desorbing water.

Scientific application of the principles of colloid chemistry to soils has been of much benefit in the control of soil structure and promises further aids to the farmer in the future. Such, for example, is the use of iron and aluminum compounds to promote aggregation. The importance of these materials has not been completely evaluated to date. They may assume great significance to agriculture in the future.

Spreckels SUGAR BEET Bulletin

PUBLISHED FOR CALIFORNIA SUGAR BEET GROWERS BY THE SPRECKELS SUGAR COMPANY

Vol. VII FEBRUARY 1943 No. 2

DIXIE BEET THINNERS HAVE ARRIVED

By C. E. CRANE, *Agricultural Superintent*
Spreckels Sugar Company

The Dixie Beet Thinner, made by the Dixie Cotton Chopper Company of Dallas, Texas, was originally developed to block cotton mechanically. The machine proved to be very successful for this purpose. Three years ago the Spreckels Sugar Company became interested in the possibility of using the machine to block beets and conducted numerous experiments to determine its value. The present model of the machine is capable of satisfactory blocking of sugar beets planted either on beds or flat.

The Spreckels Sugar Company has purchased one hundred of these machines. The machines have been built and are now being shipped. These two-row machines are to be rented out to the grower at 50 cents per acre. It is possible to cover from 6 to 8 acres per day with each machine.

This machine consists of two rotary heads each holding four knives and each setting over adjacent rows of beets. The width between rotors can be adjusted from 12 to 22 inches, thus giving the necessary spread to operate on a single bed or on any desired width of flat planting. This whole cutter arrangement is mounted on a framework and carrying wheels, so that it makes a complete unit to be pulled down the row.

As the machine is pulled down the row, these knife rotors revolve, each cutting across its row, leaving blocks as determined by the setting given the knives. The width of block left is determined by the spacing between the knife blades. This setting is secured by turning the knives in the holders so that the distance between the end of each blade to the back of the shank of the next knife represents the width of block to be left. The distance between blocks on the machines as delivered will be 6 inches. However, different gears have been ordered so that if found desirable, this spacing can be changed. It was found by experimentation and study that a setting for a narrow block left six inches apart gave the best count per hundred feet of row.

BEETS SHOULD BE BLOCKED EARLY

Blocking by this machine on any planting will have many advantages, especially if the beets are planted with sheared seed and an even, thin stand has been secured. On any field it will be found to the grower's advantage to block the beets while they are small, thus eliminating 75 per cent of the weeds in the row and leaving the blocks of beets to be thinned later. This also eliminates crowding and allows greater time for the thinning crews to get to the job without injuring the beets by overpopulation. The design of the cutter is such that the beets left in the row are not disturbed and thus it is possible and desirable to block while the beets are quite small. The particular advantage on beets planted with sheared seed is that if a good even stand is secured and the proper setting of the machine is used, sufficient elimination of doubles will probably result so that the resulting stand can be carried on to harvest even if no labor is available to dress it up. By the use of this tool considerable labor and expense can be saved both in thinning and hoeing. As soon as you plan your thinning operations, contact your local fieldman.

GROWER TESTS SHEARED SEED

WHOLE AND SHEARED SEED PLANTINGS GIVE EQUAL RESULTS

Sugar beets in the photograph were grown on the Harold Meek Ranch at Woodland, California.

The beets in the row in the foreground were planted with whole sugar beet seed with a harvest stand of 90 beets per 100 feet of row, producing approximately 18 tons of beets per acre.

In the back row are beets planted with sheared seed with a harvest stand of 60 beets per 100 feet of row, but with a yield per acre equal to that of whole seed. It will be noted that the beets planted with sheared seed are more uniform in size than the beets planted with whole seed because of more uniform spacing in the row.

SPRECKELS TWO BEET SHEARING PLANTS COMPLETED

By GEO. P. WRIGHT, *District Manager*
Spreckels Sugar Company, Spreckels

The results from 10,000 acres planted to segmented or sheared seed in 1942 prove that the planting of this type of seed is entirely practical. A comparison of the crops produced from whole or unsegmented seed shows that the returns in yield, sugar per cent and sugar per acre are substantially the same. Comparisons also show large savings in the amount of "stoop" labor required to thin with a corresponding saving in cost of thinning.

8

Emptying whole seed into hopper.

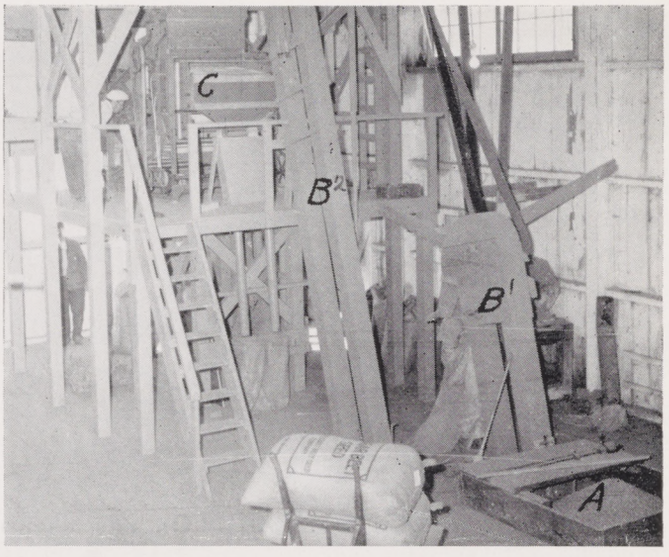
This development and successful use of segmented seed has come at a most opportune time. Because of war conditions it will be necessary to use available labor efficiently. Under these conditions thinning beets planted with whole or unsegmented seed does not make for the most effective

9

Sacking sheared seed in 50 pound second hand burlap bags.

use of labor. The use of segmented seed, on a large scale, for seeding the 1943 crop is, therefore, a necessity.

In order to provide growers with their supply of segmented seed for 1943 plantings, Spreckels Sugar Company has installed two complete shearing and cleaning plants. One of these is located in the beet seed warehouse at the Woodland factory and the second unit is in the beet seed warehouse at Spreckels, each with a minimum capacity of 100 bags of whole seed per day.



10

Beet shearing and cleaning plant in the Spreckels Sugar Company Seed Warehouse at Spreckels, California.
Hopper for receiving seed is shown at "A".
"B1" and "B2" are the elevator legs.
Behind "B1" is the shearing wheel.
The cleaner is located at "C".

The equipment consists of 5 inch shearing wheels and a Crippen Seed Cleaner. The capacity of this equipment is sufficient to take care of the requirements of all growers who wish to plant segmented seed. The accompanying photographs will give some idea of this shearing and cleaning equipment.

In addition to shearing, the operation provides the grower with a seed free from dust, sticks, and stems which are liable to interfere with proper seed distribution and makes a product ideal for seed treatment and planting with his existing equipment.

PLANTING SHEARED SEED

CALIBRATION OF DRILLS NECESSARY

By H. J. VENNING, JR. *and* R. T. BROWNSCOMBE,
Agricultural Department, Spreckels Sugar Company

Sheared seed makes it possible to secure a large percentage of single beet seedlings. When sheared seed is spaced evenly in the row single seedlings are secured instead of bunches of two to five seedlings normally obtained.

The shearing process consists of breaking the normal beet seed ball, containing from 1 to 5 germs, into units containing a single germ. It is a mechanical operation which breaks the seed ball along its natural cleavage lines, causing no injury to the germ itself.

In planting sheared seed, precautions should be taken to assure a firm, well mulched seed bed.

The treating or dusting of sheared seed prior to planting helps to remove the hazard of "dampening off" and is good insurance. The recommendations of Dr. L. D. Leach, of the University of California at Davis, are as follows:

1. New Improved Ceresan—½ pound per 100 pounds of seed.
2. Regular 2% Ceresan—1½ pounds per 100 pounds of seed.

Seed should be treated prior to planting by one of the various methods mentioned in previous bulletins.

The rate of planting sheared seed depends upon the soil type and anticipated climatic conditions. In general, from 5½ to 7 pounds per acre seems to be advisable in the earlier plantings where crust and other adverse conditions may occur. Later in the season from 3 to 5 pounds is usually sufficient. However, each field and each type of soil present a separate case and must be treated as such. No general rule can cover all cases.

As a guide to planting rates, the University of California has developed a table showing the various planter gears and resultant seeding rates per acre as shown below:

JOHN DEERE PLANTERS

Number of Teeth in Gear	Model #18 and #32	Model #55
	(Pounds Seed per Acre)	
12	2.6	4.4
14	3.0	5.0
16	3.4	5.7
20	4.2	7.0
24	5.0	8.2
30	6.0	10.0

This table is presented only as a guide. Each grower should calibrate his own drill by a method similar to the following: The planter should be pulled through the field for a measured half mile. The amount of seed used from each can should be weighed and this amount multiplied by ten gives the pounds per acre being planted by each can. A known weight of seed may be put in each can and by reweighing the seed after the trial run, the amount used will be easily figured. In the case of a box type planter, paper sacks may be tied on each tube giving the weight of seed used.

With a Planet Jr. planter it is found that the size of the hole to be used varies with the size of the seed and the speed of the tractor. Using seed now being sheared at Spreckels and with a tractor speed of not over two miles per hour, a No. 17 hole will plant about 5 pounds of seed per acre. Each machine must be calibrated to determine the hole to be used to obtain the seeding rate desired.

Extreme care must be taken in planting of the sheared seed to see that it is not placed too deep. The seed is much smaller than regular seed and, therefore, drops deeper into the shoe furrow than whole seed.

LABOR CAMPS NEED IMPROVEMENT

By A. L. KNUDSEN, *Labor Superintendent*
Spreckels Sugar Company

Much has been said from time to time during the past several years about housing facilities for labor. A grower raising crops that require hand labor should realize that his labor camp is just as necessary for the successful operation of his business as any of his other equipment.

For many years when labor was plentiful and wages lower, many growers got their work done without furnishing a camp for their labor. Their labor contractors transported the crews many miles at a small cost, and sometimes at no cost at all to the growers. Due to shortage of both labor and rubber, this is now practically impossible.

During the season of 1942, a number of camps housing labor for the sugar beet fields were cited by the Camp Inspectors for failure to comply with the State Housing Laws. A few were entirely inadequate. On account of the acute labor shortage, the State Department of Housing has been lenient in enforcing the Housing Laws during the past two years. This Department, however, may not continue to be lenient.

There are many labor camps in the beet fields that will pass inspection; some will just barely get by, and a few are very poor camps. All growers should immediately take steps to improve their camps for the 1943 season. They should make early application for materials for repair so they will have them in time. The best camps usually attract the best class of labor and have the smallest turnover.

The difference in cost of improving a camp so as to make it comfortable and attractive, or just barely fixing it to get by, is very little and cannot be considered a saving. A good camp is an asset and actually pays dividends to the grower in the form of reduced labor costs and turnover. A poor camp is apt to be a distinct liability by increasing costs, especially when there is a labor shortage.

The responsibility for furnishing a suitable labor camp depends upon the agreement between landowner and tenant or grower, but in any event, it is the obligation of the grower to take whatever steps may be necessary to secure adequate housing facilities for his labor.

Maintenance and upkeep of the camp is always an obligation of the grower that should not be passed on to others. A landowner may furnish a first class camp but the grower should supervise and inspect it and see that it is kept clean and sanitary and that all the necessary camp equipment, such as cook stove, water heater, showers and plumbing are functioning properly.

The inspectors of the State Division of Immigration and Housing are at the service of the farmers and are ready and willing to assist and advise in planning the construction or improvement of labor camps. An article on Housing by H. F. Melvin in the October 1942 issue of the Sugar Beet Bulletin gives the essential requirements of a labor camp.

MARK DETHLEFSEN—54 YEARS OF SUGAR BEETS

By CHAS. L. PIODA, *Resident Manager*
Spreckels Sugar Company, Spreckels

Notwithstanding attempts to grow sugar beets in numerous scattered locations in the United States, California was the first state in the Union and Alvarado the first district in which the effort was successful.

The Alvarado factory was built in 1870 and operated sporadically, producing 155,784 bags of sugar up to 1888. In that year Mr. Claus Spreckels built the Western Beet Sugar Factory at Watsonville and turned out 33,500 bags of sugar.

MARK DETHLEFSEN

Among the men who grew beets for this plant in its earliest days is Mark Dethlefsen, whose picture appears herewith.

Mr. Dethlefsen was born in Denmark in 1872 and came to Watsonville with his father in 1887, where the family engaged in farming.

In 1889, he and his seven brothers grew beets for the Watsonville plant on the Driscoll Ranch.

In those days, beets were delivered in horse drawn wagons and were unloaded with forks into factory bins by hand. Many mornings teams would be lined up at the gate before daylight for blocks, waiting to be weighed and to start the arduous job of unloading. Occasionally a hobo could be picked up who would help unloading in return for a breakfast.

In 1896, he and several of his brothers rented 238 acres of the Breen Ranch, near San Juan, and grew a crop of 4151 tons of beets, which was delivered at Betabel. The results of that season's operations were printed in the Watsonville Pajaronian, April 29, 1897, and interesting comparisons can be made with the 1942 crop just past (See below). This was the first year in which Mr. Dethlefsen used beet nets in his wagons.

Later he returned to Watsonville and has raised beets for the Spreckels Sugar Company almost continuously on the Beach Road, near Watsonville, where he now owns one of the finest ranches in the Pajaro Valley.

For the past fifteen years, he has been associated with his son, Irvine, who in recent years has taken over the entire job of farming.

Mr. Dethlefsen is an active member of the Watsonville Rotary Club, and of Civic and Fraternal organizations of that city. He keeps in touch with the latest agricultural development and his ranch is usually near the top of the honor roll of beet production.

THE FOLLOWING WAS TAKEN FROM THE PAJARONIAN OF APRIL 29th, 1897:

STATEMENT OF CROP OF SUGAR BEETS RAISED FOR WESTERN BEET SUGAR CO., WATSONVILLE, IN 1896, BY DETHLEFSEN BROS. ON RANCH OF P. BREEN, NEAR SAN JUAN, CALIF.

We give below a statement of the cost of raising and profits of beets farmed by the Dethlefsen Bros. near San Juan. It will be noticed that a handsome saving was effected by working beets by day labor instead of contracting them. The thinning, topping and loading of beets into wagons cost 55 cents per ton of beets, whereas the neighbors paid $1.05 per ton of beets to contract those operations; the Dethlefsens here made a gain of $2,225.50. It should be stated that the profits to the Dethlefsens were greater than shown by the statement, as all of their own work is charged for at full rates of wages. The hauling charge of 50 cents per ton for three mile haul is too high and with improved roads and sprinkling service will cost less this year. We will, from time to time, furnish our readers with similar accounts of the best farmed beet fields in the Pajaro, Salinas, and San Benito Valleys. Beet farmers will find these useful for comparison.

Expenses	Total Cost	Cost per Acre	Cost per Ton
Rent of 238 acres at $7 per acre	$ 1,666.00	$ 7.00	$ .37
First plowing $340.00			
Second plowing 396.65			
Cultivating and harrowing 500.00	1,236.65	5.19	.28
Sowing—labor 85.00			
—use of drill 28.00	113.80	.49	.03
Seed—2,830 lbs. at 10 cents	283.00	1.19	.06
Thinning—1,100 days at $1.00	1,100.00	4.62	.25
Cultivating and weed cutting—one man and two horses, 30 days at $3.00	90.00	.38	.02
Plowing out—one man and team 95 days at $3.00	285.00	1.19	.06
Topping and loading into wagons—1,335.3 days at $1.00	1,335.30	5.61	.30
Hauling three miles to switch, at 50 cents per ton	2,225.50	9.35	.50
Freight on railroad to factory	2,225.50	9.35	.50
Cost of knives and hoes	20.00	.09	
Interest	300.00	1.26	.07
Total expense	$10,880.75	$45.72	$2.44
Income			
4,451.275 tons beets at $4.00	$17,817.22	$74.86	$4.00
Sale of beet tops	200.00	.84	.04
Total income	$18,017.22	$75.70	$4.04
Net profit	$ 7,136.47	$29.98	$1.60

Cost of above labor done by farmers personally is estimated at current rates of wages.

Nature of soil—Deep sandy loam, on banks of San Benito River, not subject to overflow.

Previous crop—Pasture for seven years.

First plowing—In November, 6 inches deep.

Second plowing—In February and March, 10 inches deep.

Commenced sowing—May 1st, 1896.

Finished sowing—June 3d, 1896.

Commenced harvest—September 8th, 1896.

Finished harvest—January 19th, 1897.

Yield of beets—18.70 tons per acre.

Rainfall for 1895-1896—22.05 inches.

Average pounds of seed sown per acre—10.

Number of acres resown—50.

Fertilizers used—None.

BEET HARVEST MACHINERY PROGRAM MAKING PROGRESS

By J. E. COKE, *General Agriculturist, Spreckels Sugar Company*

The Spreckels Sugar Company has made application to the War Production Board for allocation of materials for the construction of harvesting machinery for use in the harvest of the 1943 crop. What disposal the War Production Board will make of this request is not known, but the request has the full backing of the California U. S. Department of Agriculture War Board, which should aid materially in securing approval.

The Spreckels Sugar Company proposed in its application to construct 4-row beet topping units which will top the beets in the ground, side-delivery rakes for the removal of the tops from the rows which have been topped, 4-row beet lifters of the 2-point Colorado type equipped with bars to lift the beets completely to the surface of the ground, and cross conveyors sufficiently wide to cover twenty rows, so that ten men picking up beets behind the conveyor can load trucks.

Experience indicates that these machines will save from 60-65% of the labor normally required to harvest beets by the usual hand method. Sufficient equipment is being requested so that by operating the machines a nine-hour day, approximately one-half the acreage the Spreckels Sugar Company expects to contract this year can be harvested by these machines.

There is no reason why these machines cannot be operated two shifts or 18 hours, thus providing sufficient machinery for harvesting practically the entire crop.

It is the plan of the Spreckels Sugar Company to rent these machines to growers under a system wherein a complete harvesting unit of these machines will be allocated to a given acreage. The acreage which each unit will handle will be sufficiently large so that several growers may work as a group in the operation of each unit.

It is hoped by the next issue of the Spreckels Beet Bulletin that the allocation of materials for these machines will have been granted by the War Production Board, at which time further detail regarding the machines will be given.

INSECT AND DISEASE CONTROL REVIEWED

By E. A. SCHWING, *Entomologist, Northern California Beet Sugar Companies*

The cheapest control for all insect and disease damage is prevention. Control of the beet leaf hopper (Eutettix tenellus) for the season of 1943 has been attempted to prevent Curly Top disease which affects sugar beets. By controlling this insect at its source, Curly Top should not be a factor in any beet areas. Some Eutettix may be found in a few minor areas in the central and southern San Joaquin Valley, but early planting in these areas should prevent any important damage.

The insects with which we will be concerned during the next few months are *wireworm, black bean aphis,* and *cutworm.* The diseases are the seedling diseases of *Pythium, Rhizoctonia,* and *Phoma.* We should take into consideration the *wooly aphid,* the *garden centipede,* the *beet nematode,* the *garden nematode,* and the disease *sclerotium.*

WIREWORM

The *wireworm* occurs largely on sandy loam soils where it is possible to plant early in the season. It is recommended that where the presence of wireworm is known, beets should be planted in January or February with 50 per cent excess seed so as to assure a good stand. If wireworms begin to work before thinning commences, thinning should be held up as long as possible without injuring the beets. Sometimes the beets are planted on soil infested with wireworm without the grower being aware of the danger until damage appears. In this case, delayed thinning and the use of cultivators to dry the upper surface of the soil thus forcing the wireworm to go deeper in the soil is advocated.

BLACK BEAN APHID

The *black bean aphid* usually develops on horse beans, bell beans, rape, or garden beet seed early in the season. By controlling the black aphid on such crops in the vicinity of beet fields, the cost of control will be much lower than for control later in the season on the sugar beets. Nicotine or rotenone dust is effective in controlling this insect.

CUTWORM

The *cutworm* usually works in the fields during March, April, May, and June, according to the area and climate. We have had attacks as early as January in the Hanford area. A poisoned bran mash, made by adding one quart of sodium arsenite to 25 pounds of bran with enough moisture added so that the resultant mash when squeezed will release a few drops of water through the fingers, is

(Continued on next page)

THIN EARLY TO AVOID EXCESSIVE COSTS

One of the factors which contributed to the high cost of thinning and hoeing the 1942 beet crop was that in numerous fields beets were permitted to grow too large before having them thinned.

To be sure, the shortage of available labor was primarily responsible for that condition. In 1943 if such a problem must be met, growers have at their command information and equipment that will enable them to cross-cultivate their beets more easily before they get too large, or, by using a Dixie Beet Chopper, to block their beets while they are still small.

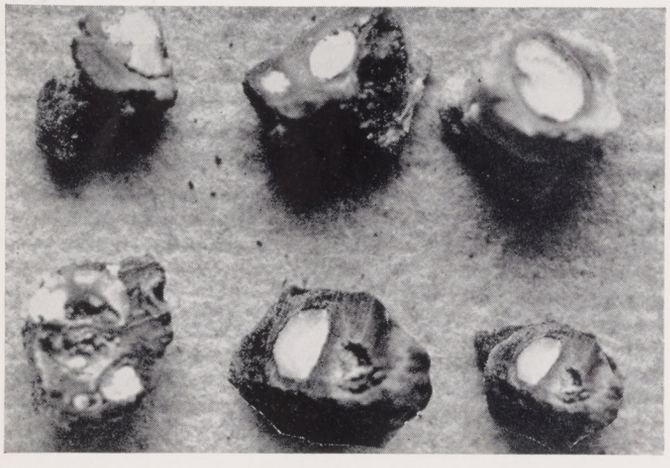
Nothing is more discouraging than to pay an excessive price for thinning large beets and then have such a growth of weeds that it costs an unreasonable sum to get them hoed.

If labor is scarce, mechanical blocking while the beets are small, followed by early cultivation and hoeing, should bring the weeds under control and clean up the field without excessive cost.

FROM SEED CLUSTER TO SHEARED SEED

12

A whole individual seed ball is a cluster of from 1 to 5 individual seeds. The above cross sections of seed balls show these clusters of seeds. The white areas are cut portions of the germs of the seed.



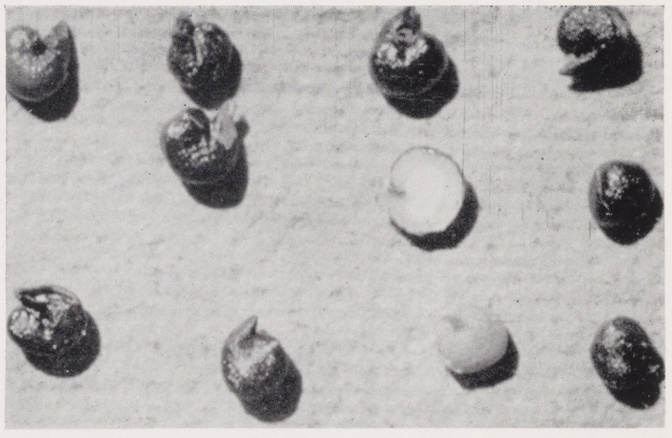
13

When beet seed is sheared or segmented, the cluster of seeds in the seed ball is broken, giving seed units 75 per cent of which contain only a single germ. The above cross sections of sheared seed show how the seed cluster has been broken into seed units containing mostly single germs.

Some of the individual seeds or germs in a beet seed ball cluster are destroyed in the process of shearing. However, the recovery of individual seed units usually nearly equals the number of seed clusters prior to shearing.

Because of the shearing process some of the germs are more exposed than in the normal beet seed ball clusters. Therefore, the seed is somewhat more susceptible to attacks of seedling disease. It is, therefore, more important to treat sheared seed than whole seed with Ceresan in order to control these diseases.

It is also important that seed treated with Mercuric fungicides, such as Ceresan, should not be stored for a length of time as there is great danger of injuring the germination of the seed.



14

The germ or kernel of a beet seed after it has been removed from the cork-like seed ball. Various attempts have been made to remove these germs or kernels from the seed and to plant them, but these attempts have not been successful.

INSECT CONTROL *(Continued from preceding page)*

satisfactory. From 15 to 20 pounds of this poisoned bran scattered over each area affected should provide control. It should be broadcast by machinery or by hand late in the evening or early in the morning to prevent drying. Some preventative action on wet soils in river bottom lands can be secured by deep discing as soon as possible before the seed bed is prepared to destroy pupae of the insect.

SEEDLING DISEASES

At this time of the year diseases that cause most of the losses to sugar beet stands are the seedling diseases. The soil diseases are *Pythium* and *Rhizoctonia* and the seed ball disease is *Phoma*. All these diseases can be curtailed considerably by treating the seed with Ceresan or New Improved Ceresan. For whole seed the rate of application is 1 pound of Ceresan or 6 ounces of New Improved Ceresan for 100 pounds of seed. For sheared seed the amount is 1½ pounds of Ceresan or 8 ounces of New Improved Ceresan. Because of some danger to the seed if treated and kept in storage, it is recommended by Dr. L. D. Leach of the University of California that the seed be treated just before planting.

The presence of *wooly aphis* is usually noticed in the fall or winter when plowing operations are taking place. If there is a wide scattering of infestation, the grower should be careful in planting sugar beets. A wet winter may reduce the numbers to a point where it is safe to plant sugar beets. On sedimentary soil, flooding as early as possible is sometimes effective in securing control.

Where the beet land is suspected of having *garden centipede, beet nematode, garden nematode,* or *Sclerotium Rolfsii,* it is best to make a careful survey in cooperation with the local field agent of the sugar company before any plans are made for planting sugar beets. The cost of raising a beet crop is too high to justify taking chances on a poor crop.

Spreckels SUGAR BEET Bulletin

PUBLISHED FOR CALIFORNIA SUGAR BEET GROWERS BY THE SPRECKELS SUGAR COMPANY

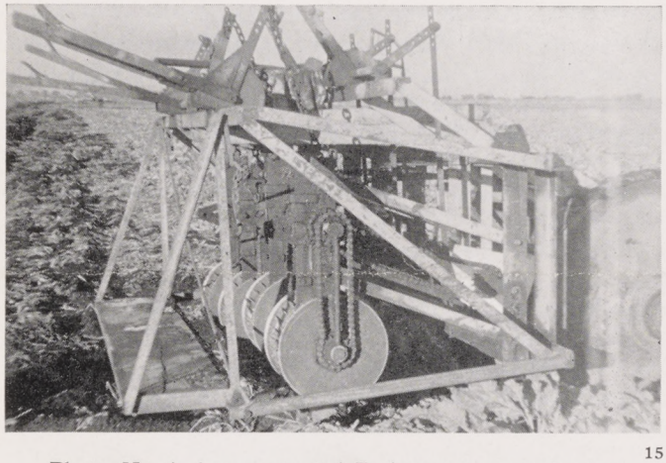
Vol. VII MARCH 1943 No. 3

BEET HARVESTING MACHINERY FOR 1943

By A. C. BULLEN, *Engineering Department*
Spreckels Sugar Company

The Spreckels Sugar Company's program for beet harvesting machinery for use on the 1943 crop includes complete harvesting equipment outfits to be allocated to given acreages. An extensive study of all known beet harvesting machines in use throughout central and northern California during the last season has resulted in the selection of a combination of unit machines to compose a completely balanced harvesting outfit. Sufficiently large acreages served by one outfit will include a group of growers who, with their present tractors and trucks, will be able to use the equipment to their best advantage. Selection of units includes those which can be operated longer than the usual 9-hour day, so that it will be possible by working two shifts or 18 hours per day to harvest mechanically practically 100 per cent of the crop. The resulting labor saving under these conditions will be approximately 60 per cent by elimination of all the topping labor.

Application has been made to the War Production Board for allocation of critical materials to permit the Company to fabricate this harvesting equipment. Immediately upon approval by the Government of this request, or any portion of it, the Spreckels Sugar Company will start fabrication of the machinery units described below.



15

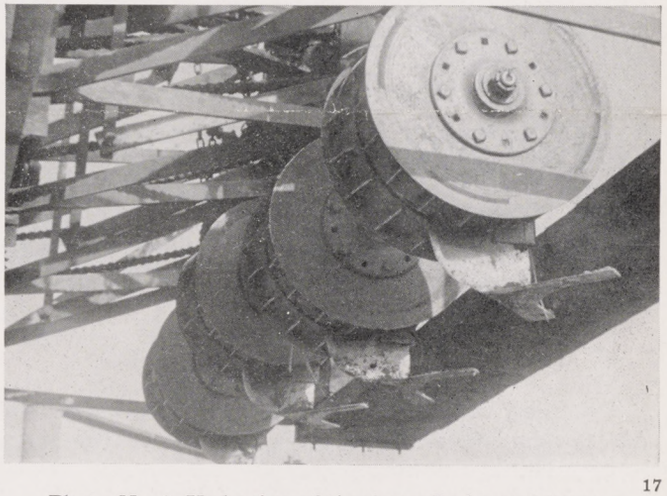
Photo. No. 1. 4-row patented Zuckerman topper, having the variable cut feature. This unit is tractor drawn. The knives follow the beet rows irrespective of the alignment of the machine carriage with the hauling truck.

The beet topper selected, as shown in photograph No. 1, is a 4-row patented Zuckerman machine having the variable cut feature. This unit is tractor drawn and carries an operator, as the topping knives are mounted on a lateral movement frame, so that the knives can be made to follow the beet rows irrespective of the alignment of the machine carriage with the hauling tractor.

This topper will operate in heavy foliage, and particularly in wet foliage, so that its use is not limited to the dry daylight hours only. Photograph No. 2 shows an example of topping accomplished with this topper. At a travel rate of 2 miles per hour it will top 1.3 acres per hour at 80 per cent operating factor. Knife changes vary, of course, with the type of soil covered. However, experience indicates that an average of two knife changes per day is required. For this reason, each topper will be supplied with three sets of knives, so that ordinarily knife filing can be done at night and not delay topping operations. Knife changing requires only the removal and replacement of one set screw per knife.

16

Photo. No. 2. Example of beets topped with the 4-row patented Zuckerman topper with the variable cut feature.



17

Photo. No. 3. Underview of the 4-row Zuckerman topper, showing the type of knives used.

(Continued on next page)

HARVESTING MACHINERY *(Continued from preceding page)*

Photograph No. 3 is an under view of the topper showing particularly the type of knives used.

After the topping operation the leaves from four rows are raked to one side with a converted side delivery rake which has been reinforced to handle heavy foliage and changed from self-driven to power-driven from its drawing tractor. No operator is used on this unit. Its use can be eliminated where leaf recovery is not practiced. Its travel is the same as the topper, so that the capacity is the same.

18

Photo. No. 4. 4-row Alvos type beet plow, showing tail rods.

For bed planting harvesting it is proposed to mount revolving brushes on the topping units, which will deposit the tops in the valleys between the beds, where they are suitable for recovery or feeding in place, as is now practiced.

Beet lifting will be accomplished by means of a 4-row Alvos type plow, shown in photograph No. 4, mounted on a Killefer or similar carriage.

19

Photo. No. 5. 20-row self-powered cross-conveyor loader mounted and balanced on its own truck chassis.

This plow is a 2-point Colorado type equipped with Alvos lifting bars, which bring the beets to the surface and leave them in a uniform position with all tails trailing. This operation greatly simplifies the following hand loading of beets onto loading conveyors.

The carriage for the Alvos 4-row plow will be equipped with two tool bars so that the plows can be staggered to accommodate the essential bowed standards and permit space changing to accommodate various beet spacings.

Tractor drawn, this plow can travel as fast as the topper, so that its capacity is comparable with that of the preceding equipment.

The next and final operation is the use of a 20-row, self-powered cross-conveyor mounted and balanced on its own truck chassis, as shown in photograph No. 5. The truck is equipped with a special low ratio transmission in order that on forward travel it can, on throttle operation, suit its speed to the capacity of the workers behind the conveyor. The conveyor's power motor is operated by throttle from the truck driver's position, so that the conveyor speed can accommodate the amount of beets loaded from various yield areas.

20

Photo. No. 6. 4-row Zuckerman beet digger and loader.

Timing loading operation with this type of loader indicates a reasonable operating capacity of 1 ton per man per hour. Covering 20 rows with one man loading from two rows, 10 men will load 9 tons per day or, at 16 tons per acre, will load 6¼ acres per day. This is practically one-half the capacity of the topper, rake and plow, so that our program includes two loaders for each topper. As the loader travels forward across the field spanning 20 rows of beets, the loaders pick up the beets by their tails from the symmetrical placing of beets on the rows by the lifter plow. The beets are thrown on the conveyor, which is of the potato chain type, thus giving some screening action and consequent dirt removal from the beets. The conveyor then continues up the inclined end and delivers the beets to trucks traveling along under the conveyor discharge.

With this type of loader, the unit does not have to be turned around at the end of the beet field. Its balance is such that two men can lift the outer end castor from the ground while the truck turns 90 degrees, then advances to cover the next 20 rows and then turns 90 degrees to return across the field. The truck turns around under the conveyor, so that the conveyer does not have to be turned around. This results in less lost time and permits the use of smaller lands at ends of a field.

It will be noted from the above that by the selection of various units in the ratio of one 4-row topper, rake and plow to two 20-row conveyor loaders, a practical balance of units is assembled into one outfit.

In the peat soils in the Delta districts, the Spreckels Sugar Company's program is to provide two complete patented Zuckerman harvester outfits. These outfits consist of one 4-row topper, one 4-row side delivery rake and one 4-row digger and loader. The latter is shown in photograph No. 6. The capacity of these outfits is 225 tons beets per 9-hour day and they will harvest approximately 50 per cent of the Company's acreage on peat lands.

PRODUCING SUGAR BEETS AT REASONABLE COST

By W. R. LIDER, *Grower in Woodland Factory District and Formerly with Agricultural Department of Spreckels Sugar Company*

High costs of production in sugar beets will make each grower study carefully the steps in growing sugar beets this year. He must be sure that every job is done thoroughly and at the correct time to insure a high yielding crop with reasonable costs.

W. R. LIDER

Land selection and *preparation* are of prime importance. These are the first steps to be taken toward reaching the goal. Count history and past production when selecting land for sugar beets. Plow in the fall and to a good depth. Plane the land, if necessary, in order to level it for irrigation purposes. Prepare the seed bed in the spring and at the proper time. Don't try to hurry the job by working the ground too wet. Later trouble with water penetration points accusingly at ground worked too wet. If the job is done quickly so that moisture is preserved, a good germination is assured. A good stand resulting from the first planting eliminates the necessity for replants, which would raise the cost of beet production.

The use of *sheared seed* in planting, with cross-cultivating later, is the next point in reducing costs. Single plants spaced evenly along the row are far easier to thin than bunches of two to five seedlings coming through together. In cross-cultivating, care should be taken in deciding the proper size block to leave, and the cut to take. This can be done by determining the per cent stand and then setting the knives for the cut and block as specified on the chart prepared by Professor Roy Bainer (Sugar Beet Bulletin, Vol. VI, p. 73). Cross-blocking eliminates many of the weeds in the row, as well as reduces the beet population so that little hoeing to speak of is required.

Cultivation is another place where a little care will tend to lower future costs. Be sure that the equipment is in good shape. If the knives and discs are sharp and in good condition for close cultivation, the cultivator bar is not sprung out of shape; and if the diamond points for opening the furrows are sharp, a good job of cultivating will result, which means fewer weeds to be removed later.

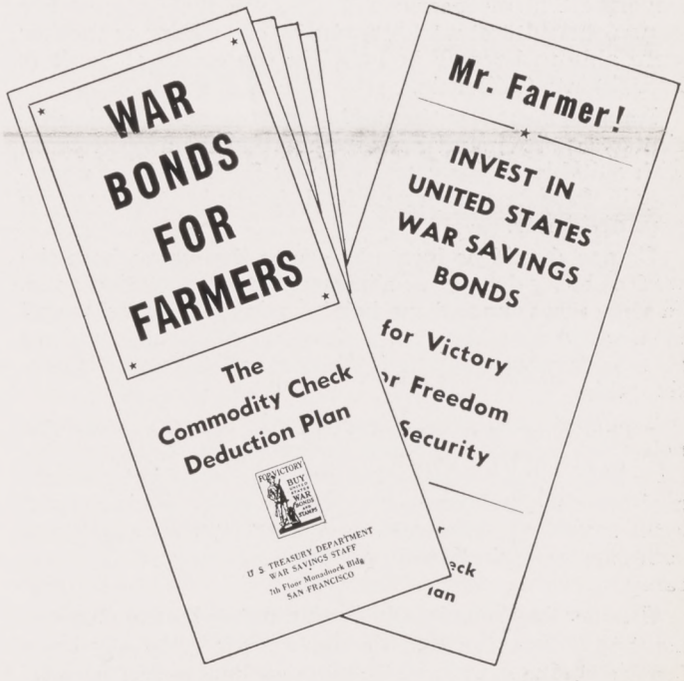
Since thinning will be eliminated for the most part by cross-cultivation, hoeing is the first major problem for hand labor. This should not be a big or costly job as the weeds will have been reduced to a minimum by cultivation, therefore all the labor has to do is cut the blocks to singles. Careful supervision of the labor will cut costs here. You can pay yourself good wages by merely being in the field. The labor is more interested in doing a good job if you are interested enough in the crop to stay in the field with them, giving advice when necessary. Labor is willing to take suggestions when properly given and will help you produce a better crop of beets.

Irrigation is another place where costs rise unless you are careful in laying out the ditches and planning the use of water so that it is evenly distributed with little waste. Use a surveying instrument in order to make sure the ditches are right. Plan for drainage of the low spots. Make the job of distributing the water as easy as possible for the labor. The more shoveling he has to do, the slower becomes the job of covering the acreage and the higher the costs.

Harvesting is probably the biggest item in the whole production picture. The topper and loader, while still in the experimental stage, are far enough developed to use with confidence. If they can be made available, a substantial cut in costs can be realized by their use. Hand labor for harvest last year was very costly and hard to manage. The situation can be improved by providing the labor with good housing and taking a personal interest in their set-up. The grower who had a good camp last year managed to harvest with reasonable costs.

The job of keeping costs at a reasonable figure is of great importance in sugar beet production and one can benefit by trying to follow general good farming practices. If a grower tries to save a dollar in seed bed preparation, he may have to spend five more replanting. If he fails to place his ditches properly, he loses in man hours of labor and low production from spots of "too dry" or "too wet" beets. If the cultivation is poor or done with improper tools, the cost of hoeing is high and the beets are inhibited at a time when maximum growth is expected and needed.

It is important to exercise care in each step along the line of production to avoid low yields or handicaps to labor.



MEXICAN NATIONALS SALVAGE BEET CROP

By CHAS. L. PIODA, *Resident Manager*
Spreckels Sugar Company, Spreckels

The harvest of the 1942 sugar beet crop resulted in the production of slightly less than one million tons of sugar beets for the Spreckels Sugar Company. More than one-fourth this tonnage was harvested by Mexican Nationals. Considering the fact that the first contingent of laborers did not arrive until the end of September, it is evident that if the importation had begun two months earlier, almost one-half the crop could have been handled by this class of labor. It is also likely that the harvest would have been finished by December 1.

Costs have been far above normal and above expectations. However, without these men it is probable that about one-fourth the crop would have remained unharvested, for there was no other source from which labor could be procured to do the job.

21

Mexican Nationals unfamiliar with sugar beet operations should be trained thoroughly for the jobs expected of them.

Mistakes were made in recruiting the men that were imported. The most serious of these was the large number of non-agricultural workers, who by one means or another were able to become included in the group of workers brought into California.

Improvements can be made by growers in housing facilities, and it should be remembered that a good camp with suitable sanitary and bathing facilities is as necessary in these days as proper food. A well-kept labor camp pays dividends.

Camps should be located close to the farm where the work is being done, thus eliminating transportation costs. In some cases one and one-half hours' time to travel to and from work was allowed each man and when rates paid are such as they were last fall, the cost to the grower is considerable.

The day when most farmers could depend on getting help from neighboring labor camps is gone. Consequently a suitable camp to house a crew large enough to handle his beets should be on every grower's ranch. If his acreage is too small to justify this, it may be that several growers could arrange jointly to house their labor properly in one camp.

Certification has already been granted by the Government to California Field Crops, Inc., for 7,500 Mexicans for work in the beet fields for thinning, hoeing and harvesting the 1943 crop. Arrangements with the Government have been worked out, wherein many of the difficulties which were encountered last year can be eliminated.

Consideration should be given to the treatment accorded these men when they arrive. They will be ignorant of the work required, and unused to the food and the camp life here. Consequently, they should be given careful supervision by the growers, both in the camps and in the fields, and taught the best method of handling their jobs.

Whatever agreements with them exist as to time of payments of wages, keeping time sheets, records, etc., should be lived up to scrupulously by the growers so that weekly wages may be paid promptly on Saturday without causing the men any lost time.

Paying by the hour makes the routine of timekeeping, etc., easier, but it is sometimes more costly in the end than piece work. These men should not be "babied" but they do require fair treatment, and being ignorant of the customs of the country, they are easily upset by matters, to us, of little importance.

If proper provision is made in advance for housing these men, with the experience gained last year about how to feed and treat them, with a better knowledge on the grower's part as to their peculiarities and a better education of the workers as to what is expected of them, satisfactory results should follow in the use of Mexican Nationals.

HONOR ROLL FOR 1942

Growers producing an average yield of sugar beets grown under contract in 1942 in excess of 25 tons per acre are shown on the list below:

Grower	Acres Harvested	Tons Beets Per Acre	Lbs. Sugar Per Acre
P. A. Scurich & Sons	14.2	33.6587	11,410
Frank Minhoto	10.0	33.3338	11,140
Clarence Vosti	36.9	29.5797	10,400
Bianco & Soria	61.1	26.9843	10,313
John S. and Leo Tamagni	24.5	29.1252	10,235
P. M. Resetar Co.	10.0	31.1286	10,223
O. O. Eaton	28.9	28.8665	10,028
Thomas Nunes, Jr.	36.6	27.0821	9,977
John R. Breen	21.3	27.9902	9,953
John S. and Leo Tamagni	9.6	28.7791	9,917
C. C. Hockabout	21.6	25.8364	9,885
T. H. Holthouse	9.0	28.3559	9,647
John T. and Alvin Brazil	16.5	28.2987	9,633
Frank Tunzi	7.1	28.1307	9,593
J. and A. Andersen	19.2	26.7289	9,574
Irvin Dethlefsen	22.5	26.1765	9,450
Irvin Dethlefsen	14.0	26.7903	9,232
Antonio and John Telles	19.5	25.6123	9,195
O. O. Eaton	20.9	27.0572	9,183
Paul B. Tavernetti	18.7	27.5928	9,139
Sears Bros. & Co.	27.4	25.0178	9,086
E. H. Speigl	66.2	25.0326	9,007
Q. L. Gerhart	47.3	27.70	8,947
M. L. Kalich & Co.	22.3	25.1133	8,910
O. O. Eaton	13.0	26.3538	8,891
J. Jacobsen	3.8	26.2425	8,828
Petit Bros.	76.2	25.0432	8,745
Settrini Bros.	34.6	25.2878	8,664
S. J. Pavlovich & Sons	38.5	25.9439	8,639
Wm. Jensen & Sons	12.9	25.7394	8,237
B. E. Lundholm	49.1	26.4176	8,237
Jack Hogan	34.2	25.7638	7,940
Vertin Edmonds Co.	28.0	25.5031	7,824
H. Milani	38.3	27.17	7,770
J. O. Ensley	18.3	25.72	7,217
R. Ripken	206.0	25.00	6.905

PLAN 1943 FERTILIZER PROGRAM NOW

By GUY D. MANUEL, *Agricultural Department*
Spreckels Sugar Company

Application of fertilizers has become as uncertain as any other of the growers' operations. The scarcity of fertilizers has made necessary many changes in a well-planned farming program.

Growers planning on a program that involves the use of commercial fertilizers should decide on their needs and contact their fertilizer dealers as soon as possible, giving them their requirements. The supply of fertilizers is definitely limited, especially as to types available. The so-called "simple fertilizers" such as Ammonia gas, Ammonium Sulphate, Ammonium Phosphate, Sodium Nitrate, and Liquid Phosphoric Acid are available, but only in very limited amounts. Unfortunately many growers will probably have to rely on the mixtures or "complete fertilizers."

The War Production Board has set up a list of mixtures that will be allowable for sale in California for 1943. Of these mixtures those with high nitrogen, such as 17-7-0, should be used. However, there are 31 different mixtures listed, any of which can be used, but the grower should know how much plant food he is supplying.

Over a period of years, it has been found that nitrogen has given the most response on the majority of California soils, and in deciding on any mixture this should be kept in mind. In picking a mixture to use, the grower must decide when he wants to use it and how soon the plants will need it. If it is to be applied at planting time or near thinning, a mixture with more of the ammonium nitrogen is best, as the nitrogen will become available over a longer period of time and will not be as subject to leaching. When the beets need the fertilizer immediately, the mixture should contain as much of the nitrate nitrogen as possible.

In reviewing the results of fertilizer applications of the past season, it is quite evident that the responses were far from normal. To what causes such poor growth can be attributed would only be a guess, but certainly climate and other such variable factors were involved. There were instances this past season where 80 units of ammonia gas were applied, and the beets showed a nitrate deficiency all year, or until very late in the fall. When nitrates were applied in the summer, responses were noted but not as decided as in other years. Related to the same condition of poor availability, it was noticed that even when beets were plowed out, bean straw, stubble, and cover crops were still not completely rotted. Evidently the organisms that bring about the breakdown of the organic material and conversion of plant foods to available form were unable to carry out their normal functions.

From such a season as this past year it is impossible to judge a fertilizer, and growers should not let the results influence them too much in selecting a fertilizer for the coming season unless they have had similar results in the past. The only sure way to know what response can be obtained from a fertilizer is to leave portions of the field unfertilized as check plots. Difference in results can often be noted by visual observation. Such a practice of checking fertilizers has been overlooked by too many growers and many growers, after a number of years of farming, still are not sure what response can be attributed to the fertilizer.

In going ahead with your 1943 program, learn from your local dealer what fertilizers are available and order them early. If at all possible, leave check plots in the field so you will know just what the fertilizer did contribute.

IMPORTANCE OF WELL-KEPT CULTIVATOR EQUIPMENT

By H. T. CARLSON, *Assistant Agricultural Superintendent*
Spreckels Sugar Company

In checking over equipment before the season starts, it is well to remember the importance of the cultivator.

Having good cultivating equipment, and keeping it in top-notch working order, is very important both from the standpoint of maximum production and lower hoeing costs. The steering devices of the equipment should be checked carefully, worn parts replaced, and all unnecessary play eliminated. This will enable the operator to cultivate close to the beets. It is important to loosen the soil adjacent to the row. This practice also destroys more weeds, thereby lowering hoeing costs.

Care should be taken in setting the tools so that the soil

22

Cultivator equipment which is in good condition and carefully adjusted does much to reduce the cost of production of sugar beets.

is not pulled away from the plants. It is obvious that all pieces of equipment, such as discs, knives and chisels, should be kept sharp and in good condition if the best results are to be obtained.

Close, careful cultivation means good soil tillage, best possible field conditions for thinning, and best possible mechanical weed control.

CONSERVATION OF MOTOR TRUCKS ESSENTIAL

By R. F. WALKER, *Traffic Manager*
Spreckels Sugar Company

California, and particularly the California farmer, is faced with a very serious transportation problem for the duration of the war and probably for a considerable time after cessation of hostilities. Transportation is the life blood of our agriculture and industry.

All of our agricultural products must be transported by truck from the fields to the railroad, processing plant, market or ultimate consumer. Without truck transportation the farmer cannot dispose of his crops, the processor cannot operate his factories, and the consumer cannot obtain necessary food. Unfortunately, the life of motor truck equipment is comparatively short, and all the materials required for its repair and maintenance are critically scarce. New trucks cannot be obtained. The supply of replacement parts, such as drive-shafts, drive-axles and general heavy repair parts, is almost exhausted. Most of these parts are made of scarce alloy steels, and manufacture of new parts is very limited. Each month an increasing number of otherwise serviceable trucks go out of serv-

(Continued on next page)

MOTOR TRUCKS *(Continued from preceding page)*

ice for the duration through failure of some vital part that cannot be replaced.

The rubber outlook is very uncertain, and, although every effort is being made to supply necessary rubber to essential trucks, our supply of rubber continues to dwindle and the demands of our armed forces increase. The Office of Defense Transportation reports that during the last sugar beet season trucks were generally badly overloaded in the fields and that, as a result, an alarming number of breakdowns occurred through failure of drive-shafts, drive-axles and other vital power transmission parts, all made of scarce alloy steels and all increasingly difficult to replace. Operation of overloaded trucks in loose or rough ground is also very destructive to tires, and many tire failures from this cause were reported.

The following suggestions, while merely a reminder of facts with which we are all more or less familiar, may be helpful:

1. Keep tires inflated to the proper pressure, and check the pressure frequently with an accurate tire gauge.

2. Promptly repair breaks or cuts in tread or sidewall, which, if neglected, may permit moisture and dirt to penetrate into the tire carcass and cause decay and eventually a blowout.

3. Do not run any tire past the point at which it can be recapped (about ⅛ inch of tread rubber remaining above the breaker strip or outside ply of cord) if this can be avoided. In no event permit any tire to run until the body plies are so worn that it cannot be retreaded. A tire worn past the two outer body plies is usually beyond retreading.

4. Straighten, repair or replace bent or damaged rims.

5. Keep tires on dual wheels properly matched, so that no one tire carries more than its share of the load.

6. Avoid excessive or violent use of brakes, and keep brakes properly adjusted.

7. Be sure that both front and rear wheels run true, that front wheel caster and camber alignment is correct, and that loose or worn king-pins, bushings, wheel bearings or steering rods are properly adjusted or repaired.

8. Make minor mechanical repairs and adjustments immediately, thereby avoiding major repairs, or breakdowns which cannot be repaired. A misfiring cylinder, perhaps caused only by a faulty spark-plug, may seriously damage main or connecting rod bearings, causes dilution of crankcase oil, and is hard on the entire machine. A faulty cooling system and consequent overheating may ruin an engine if allowed to continue. Any moving part which is excessively worn or out of adjustment throws a heavy and often destructive strain on the entire mechanism.

9. Do not overload, and apply power carefully and smoothly, especially in heavy going and in low gear.

10. Lubricate carefully and at proper intervals. Hot and dusty operation demands frequent lubrication. Even a truck that is idle, or used infrequently, needs regular lubrication. Otherwise grease hardens and "freezes" in bearings and grease-passages, and proper greasing becomes difficult or impossible.

COMMERCIAL BEET SEED VARIETIES AVAILABLE

By RALPH S. LAMBDIN, *Agricultural Department*
Spreckels Sugar Company

CHARACTERISTICS AND PERIODS FOR PLANTING EACH IN DIFFERENT AREAS:

Prior to the war a number of varieties were imported from various European countries and these along with the domestically produced seed provided varieties from which selections could be made for commercial plantings although many of these were similar in characteristics.

At the present time the trend is toward selection and reproduction of the outstanding varieties. This will enable a comparatively few varieties to meet the requirements of the varying California conditions.

The characteristics of the four principal varieties now in commercial use are as follows:

U.S. 15 — A domestically bred sugar type highly resistant to bolting and moderately resistant to curly top and downy mildew. This variety is used throughout California for winter planting, that is until about the end of January, and may be used for late planting in areas free from curly top.

Old Type — (Domestic reproduction of a well known European seed). A yield type moderately low in bolting, used for early and late plantings in blight free areas, but should not be used during periods when Eutettix are present. This variety has no curly top resistance.

U.S. 33 — A domestically bred sugar type of intermediate curly top resistance. This variety is used as a mid-season variety where curly top is not too severe.

U.S. 22 — A domestically bred yield type highly resistant to curly top and moderately low in bolting. It has proven itself under extreme blight conditions.

The U. S. D. A. at its laboratory and experimental station at Salt Lake City is constantly developing new strains and improving those now in use. As new strains are proven to be superior to the older ones they will be substituted therefor, to the betterment of the industry.

U. S. 33 U. S. 15 Pioneer Old Type U. S. 22

A beet variety test planted in March at King City was affected by curly top. Therefore, the variety most resistant to this disease, U.S. 22, gave the largest yield, with U.S. 33 a close second. The smallest yield was obtained from Pioneer and Old Type, the varieties least resistant to this disease.

Spreckels SUGAR BEET Bulletin

PUBLISHED FOR CALIFORNIA SUGAR BEET GROWERS BY THE SPRECKELS SUGAR COMPANY

Vol. VII APRIL 1943 No. 4

DEPTH OF PLANTING TESTS WITH SHEARED AND WHOLE SUGAR BEET SEED

By CHARLES PRICE, *Associate Agronomist,*

Division of Sugar Plant Investigations, Bureau of Plant Industry Soils, and Agricultural Engineering, Agricultural Research Administration, U. S. Department of Agriculture.

A greenhouse experiment was conducted in which sheared and whole sugar beet seed were planted in six-inch pots. Two depths of planting were used, one-half inch and one-and-one-half inches. Twenty-five seed units were placed in each pot. After the soil over the seed was firmed and wet down one series of pots was allowed to dry and crust over while the other series was kept moist by covering with glass jars to prevent drying. The average numbers of seedlings that emerged in the different depths of planting and the two treatments are shown in Table 1. No beets came up in the pots planted one and one-half inches deep and allowed to crust over.

Table 1. Greenhouse Test in Pots With Sheared and Whole Sugar Beet Seed.[1]

Type of Seed	Depth of Planting Inches	Seedlings Per Pot: Surface Soil Mellow Number	Seedlings Per Pot: Surface Soil Crusted Number
Sheared	½	12	12
Whole	½	24	22
Sheared	1½	11	0
Whole	1½	23	22

[1]Two pots of each treatment.

A field test at Riverside, California, was made with sheared and whole seed planted one-half inch deep and one and one-half inches deep. The seed was planted in dry soil and then irrigated. A crust formed on top of the soil before the seedlings emerged. The numbers of seedlings that came up in the different treatments are shown in Table 2. Under the conditions of this test the sheared seed gave a good stand from the one-half inch depth of planting but gave no stand at all when planted one and one-half inches deep. This evidence indicates that where the beets are to be irrigated up or soil crusting from rain may be expected it is advisable to plant sheared sugar beet seed one-half to one inch deep.

Table 2. Field Test With Sheared and Whole Sugar Beet Seed Planted at Riverside, California, June 9, 1942.

Type of Seed	Depth of Planting Inches	Seedlings Per Foot on July 10 Number[1]	Rate of Seeding Per Acre Pounds
Sheared	½	3	7
Whole	½	12	17
Sheared	1½	0	7
Whole	1½	8	17

[1]Averages of six replications.

BLOCKING SIX ROWS AT ONCE

A. L. Roddick and Sons Successfully Use Dixie Blocker on Bed Planting

By C. E. CRANE, *Agricultural Department Spreckels Sugar Company*

Many farmers in the Salinas Valley have not taken full advantage of the use of the Dixie Beet Thinners the Spreckels Sugar Company has made available to them. In view of the shortage of thinning labor it would appear that more of the machines should be used. Evidently there has been some misconception about what might be expected of the machines.

No type of mechanical blocking device can do a complete thinning job, for a blocker, as its name implies, can leave only blocks of predetermined size at set intervals throughout the fields.

Practically, it is not possible to obtain uniform stands with plants spaced evenly in the row, and the nearest approach to it has been obtained by planting light poundages of sheared beet seed containing high percentages of single seed germs. The uniform placing of this seed in the row has been quite a problem, but for practical purposes almost all kinds of drills now used can be modified to do an acceptable job. Because not all of the sheared seed germinates, and some of the seed contains more than one germ, the resulting stand will include skips and doubles, and also some plants closely grouped. However, if 5 pounds of seed per acre or less have been used, there should be some separation of most of the plants in the row.

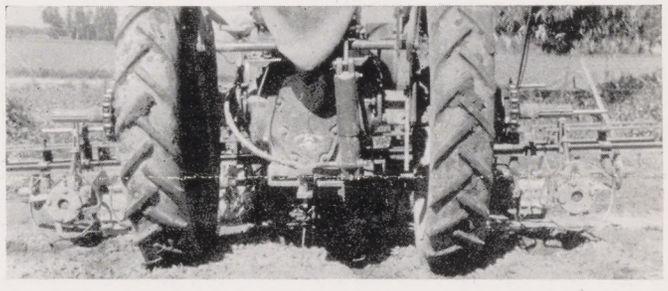


Fig. 1. Rear view showing outside cutters mounted on cross bar.

With such a stand to start with, the blocker must be set to leave the greatest possible number of single plants and from the start it must be planned to do the jobs of dressing up the stand and the first hoeing at the same time, thus saving both labor and expense. Unless this is done, the use of the machine is not justified, because a regular thinning crew following a machine-blocked stand will take almost as much time as they would to thin the original stand, leaving the first hoeing to be done.

It has been argued that a crop handled as suggested above would not produce the tonnage of a complete hand job. However, comparative results of experiments conducted last year have proven that if the original popula-

(Continued on page 19)

ADJUSTMENT OF FAIR WAGE RATE POSSIBLE WITH SHEARED SEED

By LELAND O. DREW, *Acting Sugar Program Specialist, Agricultural Adjustment Agency, U. S. Dept. Agr.*

Widespread use of segmented seed and mechanical harvesters in the sugar beet industry in California in 1943 should result in a material saving in production costs. Experience of growers who used segmented seed in 1942 shows that there was a considerable reduction in both time and labor in connection with thinning operations, as compared to unsegmented seed used under similar conditions.

Since a reduction in the amount of labor required to thin an acre may be expected where segmented seed is used, growers should be thoroughly familiar with the regulations regarding piece-work where segmented seed or other mechanical methods are used.

The federal fair and equitable wage rate determination states that "in an instance in which the use of a special machine method of planting, cultivation, or harvesting reduces the amount of labor required as compared with the method in common use during previous years in the area for an operation for which a rate is specified herein, the fair and reasonable rate shall be the rate agreed upon between the producer and the laborer, provided such rate is determined by the State Committee as equivalent to the piece rate specified herein for the part of such work performed."

Since the planting of segmented seed is considered a special machine method which reduces the amount of labor required in thinning, growers may reduce the piece rate for thinning below that published in the fair and reasonable rate determination. Growers who wish to establish a lower piece rate should use the following procedure:

1. When the grower and the laborer have agreed on a piece rate which is lower than the rate set forth in the wage determination, the grower should file an application with his county Agricultural Adjustment Agency committee.
2. The county committee will immediately submit the request to the state AAA committee, who will consider the proposed rate and approve it if it appears to be equivalent to the established piece rate for beets grown from unsegmented seed. Any reduction must be in proportion to the reduction in hours of labor required in comparison to that required when unsegmented seed is used. The amount of labor required for thinning an acre of beets from segmented seed will vary considerably under different conditions.
3. Once the laborer and the grower agree on a fair wage rate and receive approval, the approved rate will be the minimum that may be paid for thinning on that farm. Approval will be on an individual farm basis.

If no thinning is required immediately following cross blocking and a long-handled hoe is used to hoe weeds and remove what few doubles may show up, the hoeing rate may be used, without establishing rates for thinning.

A similar procedure may be used for establishing reduced piece work rates for harvesting operations where mechanical harvesters reduce the labor requirements of an operation for which piece work rates have been established. Since many types of machines will be used, there will be a considerable variation in the amount of hand labor saved by mechanical harvesting.

Recent approval by the War Production Board of applications for the construction of sugar beet harvesting equipment assures that considerable such equipment will be available in California by harvest time. Sufficient mechanical equipment has been requested to replace 60 percent of the labor required in handling the state's 1943 beet crop.

It also appears from recent developments that arrangements are moving forward to import enough Mexican workers to be of material assistance in handling this year's crop.

1943 FERTILIZER RECOMMENDATIONS REVIEWED

Excerpts from Letter from WARREN R. SCHOONOVER, *Chairman, Advisory Committee on Fertilizers, U. S. D. A. War Board*

"The so-called simple fertilizers, such as ammonia gas, ammonium sulfate, and sodium nitrate, should be available in sufficient quantity to meet normal requirements. Ammonium phosphate is available on the percentage basis to those who purchased it last year. Liquid phosphoric acid is practically unavailable. In addition to the simple fertilizers mentioned above, some ammonium nitrate is available on the market. This type of fertilizer is satisfactory for distribution in irrigation water. The supply of ammonia gas, which has gone back on the market recently, will be limited by transportation facilities.

"It is not expected that a beet grower, or any other farmer, will change from the general type of fertilizer which he used last year. The man who bought simples last year should continue to buy simples, and a man who bought mixed fertilizer last year is expected to buy mixed fertilizer. If the formula he used last year is not on the list of approved grades, he should buy the one which most closely approaches the one used previously. No manufacturer should attempt to substitute mixed fertilizer for simples when simples have been used in the past.

"You will note that according to paragraph (e) (2) of FPO-5" (Food Production Order 5 - Paragraph (e) (2) is quoted below) "each manufacturer is supposed to make and distribute quantities of the various grades comparable with those sold in the past. In view of the scarcity of phosphates, which are not yet under allocation but nevertheless very scarce on the Pacific Coast, we should object strenuously to any one using a 17-7-0 mixture if he could get along with straight ntirogen.

"Many beet growers who find themselves unable to get fertilizer at planting time will probably be able to get it from supplies which will become available later in the season, and they can apply it as a side dressing or for use in irrigation water."

Paragraph (e) (2) of Food Production Order 5:

"(e) SUBSTITUTION OF GRADES.

"(2) Except as otherwise permitted in paragraph (e)(1) thereof, each fertilizer manufacturer shall, during the 1942-1943 season, manufacture or mix and make available for distribution during the 1942-1943 season in each state supplied by him during the 1940-1941 season, tonnages of each group of the 1942-1943 approved grades containing chemical nitrogen in the same ratio which the tonnages of each group of the 1940-1941 grades containing chemical nitrogen delivered during the 1940-1941 season in the state involved bore to each other. For example, if the amount of chemical fertilizer with a nitrogen content of 5% supplied by a manufacturer for distribution in the State of Tennessee during the 1940-1941 season represented 25% of the total amount of chemical fertilizer containing chemical nitrogen supplied by him in Tennessee during that season, then such fertilizer manufacturer shall manufacture or mix and make available for distribution in Tennessee during the 1942-1943 season such amounts of grades 4-8-8, 4-10-4 and 4-12-4 as shall equal 25% of the amount of all chemical fertilizer containing chemical nitrogen produced by him for distribution in Tennessee during the 1942-1943 season."

BLOCKING SIX ROWS (Continued from page 17)

tion of the beets is not too great, and if the remaining stand, even though unevenly spaced, does not contain too large a number of groups of more than two beets each, the tonnage and sugar per acre will compare quite favorably with yields obtained by the hand method.

On March 16, Mr. Roy Bainer, Associate Engineer of the California Agricultural Experiment Station at Davis; Mr. S. W. McBirney, Agricultural Engineer, formerly of Davis, now with the Forest Service producing guayule rubber; Mr. A. A. Tavernetti, Monterey County Farm Advisor; and the writer visited the farm of Mr. A. L. Roddick and Sons to make some studies of the operation of the machine Mr. Roddick and Sons are using to block their present beet crop. These growers have taken the cutting units from three of the Dixie pull-type thinners and attached them to the cultivator bar of a model "H" John Deere row crop tractor. They plant three beds at a time, so this machine covers and blocks three beds in one operation and planting and cultivating is also carried on similarly. The cutters are geared to sprockets on the axle of the tractor drive wheels in order that the spacing may be in direct relation to the travel of the machine. An excellent job of conversion has been done and so far as mechanical operation is concerned, the machine is very satisfactory.

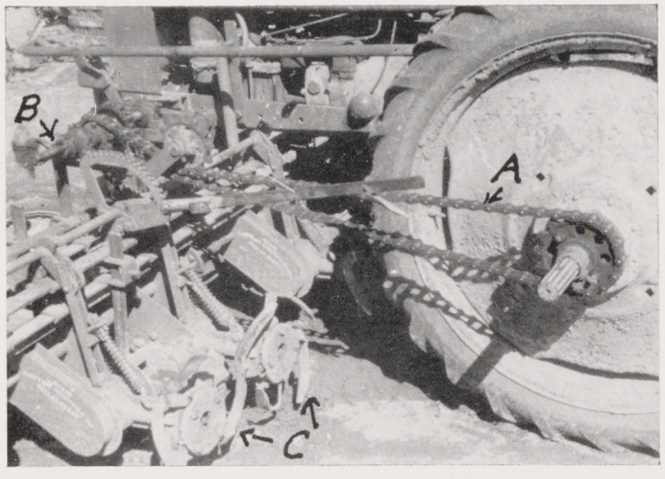


Fig. 2. Details of mounting.
A Drive chain B Jack shaft C Cutters

Several changes in the machine were made during the afternoon we observed its operation and many counts of stands were taken of each change to determine just what combination of spacing and width of block would give the most singles combined with the most desirable resultant stands per unit of row. The following table shows the results. The figures reported here are averages of numbers of counts for each change.

Planter Used	Lbs. Pltd.	Block Spacing	Width of Block	Blocks per 100′ with Beets	Singles per 100′	% of Singles
Planet Jr.	6	6″	1¾″	110	68	62
Planet Jr.	6	6″	2¼″	108	66	61
John Deere	7	6″	2¼″	148	52	35
John Deere	5	6″	2¼″	127	66	52
John Deere	5	5″	2¼″	139	81	58
John Deere	5	5″	2″	146	77	50
John Deere	5	5″	1¾″	130	71	55
John Deere	5	5″	1½″	105	64	61

These results indicated that to gain the optimum numbers of singles per unit of row it is necessary to leave blocks as narrow as possible. By leaving narrow blocks the number of blocks containing no beets increased. Thus, to make up for these skips it was necessary to increase the number of blocks per unit of row, that is, space them closer together so the skips would not affect the ultimate stand of beets.

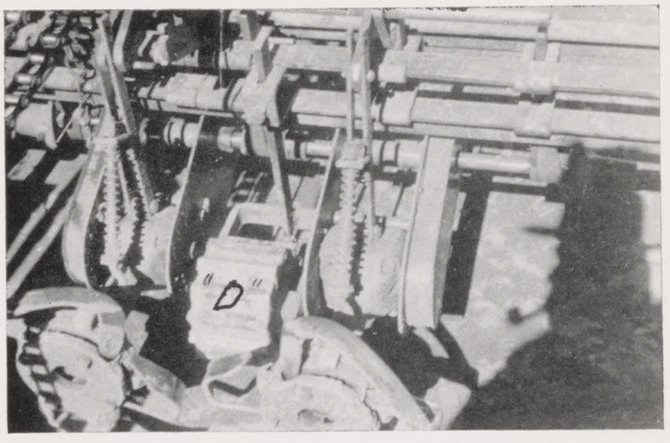


Fig. 3. "D" close up view showing gauge wheel for regulating depth of cut.

Mr. Roddick's machine was set for an original spacing between centers of blocks of 6 inches. Counts were made with various widths of blocks with this setting. The spacing was then cut to 5 inches and further counts made. The average of all counts with 6 inch spacings was 63 singles per 100 feet of row. The average of the counts on 5 inch spacings was 63 singles per 100 feet of row. The average of the counts on 5 inch spacing was 73 singles per 100 feet of row. The most satisfactory setting obtained for width of blocks with the 6 inch spacing was 2¼ inches. The most satisfactory setting for width of blocks with the 5 inch spacing was 1¾ inches. It was possible to increase the number of singles per 100 feet of row by cutting down spacing between blocks and increasing the number of chops per unit of row and narrowing the size of block, thus increasing the number of blocks containing single plants. It is true this setting resulted in a greater number of skips per unit of row, but due to the increased number of blocks it had no detrimental effect on the final stand.

Mr. Roddick has a crew of men, women and 'teen age children hoeing lettuce on the farm. He plans to have them complete the dressing up of this stand of beets and do a first hoeing job at the same time. As more than 50 per cent of the blocks, not containing singles, contain only two beets, a very satisfactory stand would result even if those blocks with more than two beets were eliminated entirely.

From these results, which were actual field trials, it can be readily seen that a saving both in labor and money can be effected by the use of the machine.

Fig. 4. Scott Roddick, who devised the hook-up.

RIDGE PLANTING

By GLENN McDOUGALL, *Agricultural Department*
Spreckels Sugar Company

In the Salinas, Pajaro, San Juan and Santa Clara Valleys, almost 100 percent of the sugar beet acreage is planted on ridges. Previous to 1928 all beets were flat planted, but after observing the successful production of lettuce when planted on ridges, beet growers quickly adopted this practice for their crop.

After land is worked up in the fall in preparation for beets, it is ridged, which allows for good drainage during the periods of heavy rain. Since aeration has been found to be an important factor in producing larger yields, good drainage is essential because it keeps the soil from becoming water logged, especially in years of excessive rainfall.

After the early rains, planting can be done at an earlier date upon beds, because of the tendency of the land to dry faster than on the flat, where more soil surface is exposed to the sun and wind.

One of the main arguments against ridge planting has been that it was harder to control weeds. This problem is now minimized because of the new and improved cultivator equipment that has been developed for this purpose. See Figure 1.

Fig. 1—Special tools attached to cultivator-tractor, set to cut weeds on top and sides of ridges before planting.

It is important to have the land surface as smooth as possible, but where it is not level, a better job of irrigating can be done with beds, because control of water is possible in the furrows. When moisture has been lost, beets can be irrigated up with the assurance of a good, even stand. When water runs too fast down the furrows, check dams can be put in to hold the water back until it has completely subbed through the bed. Figure 2.

Fig. 2—Beets planted dry on beds being irrigated up on rather steep slope. Note earth check dams in furrows protected by paper. Water must be held in furrow long enough to subirrigate bed.

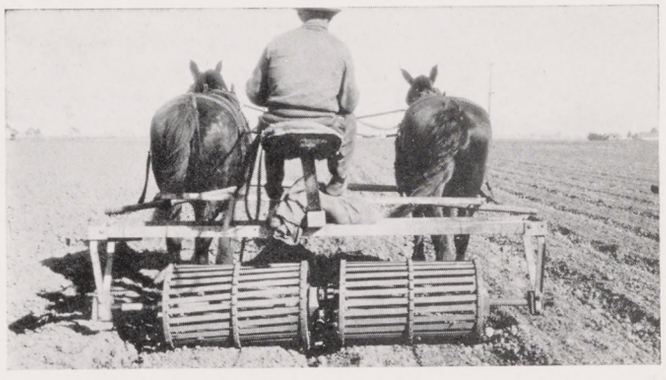


Fig. 3—Sectional roller used to break crust on ridges.

This subbing can be done without running the water over the seed bed, which would have a tendency to form a heavy crust when it became dry. Water can be kept away from the crown of the beets even on late irrigations and this makes it possible to maintain a mulch on top of the beds.

Crust can be broken easier on beds than on the flat, using the different types of rollers and breakers which have been developed for this purpose. Figure 3.

On peat land where the water table is high, growers have found that by putting their beets on beds they can get a longer and better shaped beet.

IN SUMMARY: Ridge planting is advantageous in that it allows greater flexibility in meeting weather conditions; irrigation can be done any time without considering the size of the beets; it improves irrigating practices; and is another step in obtaining greater yields, which is the objective of every beet grower.

Spreckels SUGAR BEET Bulletin

PUBLISHED FOR CALIFORNIA SUGAR BEET GROWERS BY THE SPRECKELS SUGAR COMPANY

Vol. VII JUNE 1943 No. 6

How Much Have Thinning Costs Increased?

By A. A. TAVERNETTI, *County Farm Advisor, Monterey County, California*

A. A. TAVERNETTI

In dollars and cents, the obvious answer to this question is at least 75 per cent in the past four years; however, when income is considered or costs expressed in terms of tons of beets, there appears to be little, if any, actual increase up to the present time.

Before the advent of modern economists, sugar beet growers did not concern themselves with percentages but rather analyzed costs in terms of tons of beets. In the early days of the industry, it was generally agreed that the grower made money if production was in excess of 11 or 12 tons per acre. This undoubtedly implied that the first 11 to 12 tons were required to pay costs. A part of these costs obviously was for thinning.

In 1940, growers on the average received $7.00 per ton, including government payments, for beets analyzing 18 per cent sugar. That year, thinning labor was paid at the rate of 40c an hour. Some fifty growers were able to contract thinning by the acre for an average of $8.00. Since growers received $7.00 a ton, it required 1.2 tons of beets to pay thinning costs. Growers who paid thinning on an hourly basis purchased 17½ hours of labor from the returns of one ton of beets.

In 1941, the average price received was $8.50 a ton. The hourly labor rate remained at 40c. The average cost of thinning by contract was about $9.50 per acre. The income from 1.1 tons was needed to pay thinning costs on one acre; 21 hours of thinning labor were purchased with the income from one ton of beets.

In 1942, growers received about $10.50 for 18 per cent beets. The labor rate increased to 55c per hour during the latter part of the season. Growers contracted their thinning at an average of $13.00 per acre. This represented the income from 1.25 tons of beets. One ton of beets purchased 19 hours of labor at the higher rate of 55c an hour.

In 1943, growers expect to receive about $13.00 per ton for sugar beets testing 18 per cent sugar. At the present labor rate of 65c per hour, one ton of sugar beets will purchase 18½ hours of thinning labor.

On the basis of the average figures for 1940, 1941, and

(Continued on next page)

METHOD OF FEEDING BEET-PULP SILAGE TO PREVENT FEED FLAVOR IN MILK

By J. L. HENDERSON *and* C. L. ROADHOUSE, *Division of Dairy Industry, College of Agriculture, University of California, Davis, California. In Co-operation with* R. D. JONES, *Spreckels Sugar Company, Woodland, California.*

The growth of the beet sugar industry in California has made large amounts of beet pulp available for the feeding of dairy cattle. Some of the pulp is dried mechanically for later feeding, but a large proportion is sold fresh as pressed pulp, or the untreated pulp is stored and made available for dairy farmers located within hauling distance from the sugar factories.

The Spreckels Sugar Company of Woodland, California, has been interested in the possible influence of beet-pulp silage on the flavor of milk. In order to test this point, four lots of beet-pulp silage were prepared as follows:

(1) PLAIN BEET-PULP SILAGE—The untreated pressed pulp was placed in silos and stored for several months.

(2) MOLASSES BEET-PULP SILAGE—Two and one-half per cent (by weight) of cane molasses was mixed with the pressed pulp before it was placed in the silos.

(3) MOLASSES BEET-PULP SILAGE — Seven and one-half per cent (by weight) of cane molasses was mixed with the pressed pulp before it was placed in the silos.

(4) ACID BEET-PULP SILAGE — The pressed pulp was acidified with a sulphuric-hydrochloric acid solution before it was placed in the silos. The acid solution required for treating one ton of pressed pulp had the following composition: 6.89 pounds of sulphuric acid (66°Be′), 15.02 pounds of hydrochloric acid (20°Be′), and 115.23 pounds of water. The titratable acidity was approximately 2 normal. Check analyses, in the Spreckels laboratory, showed that an acidified solution of this strength would bring the product to a pH of 3 to 4.*

The four types of silage were prepared in October, 1941, and fed at the University Farm during June, 1942. The feeding trials were conducted in the following manner:

Five groups of four cows each were used. The twenty cows selected all produced milk of normal flavor—that is, no off flavors were detected in the milk when all feed was withheld five or more hours before milking. Four of the groups were fed one of the four types of silage, while the fifth group served as the control or normal regime. The control group was handled exactly like the experimental groups except no silage was fed. All of the cows were kept from other feeds eight or ten hours before milking, in order to exclude the possibility of their influencing the flavor of the milk.

The silages were fed to the cows at definite times before milking—two, five, ten, and twelve hours for the different

(Continued on next page)

THINNING COSTS *(Continued from preceding page)*

1942, it can be expected that it will require the income from approximately 1.2 tons of beets to pay thinning costs in 1943. At $13.00 a ton, this indicates $15.50 to $16.00 an acre. Likewise based on past averages, one ton of beets should purchase 19 hours of thinning labor in 1943.

To date this year costs are rapidly adjusting themselves to near past averages. One ton of beets is purchasing 18½ hours of thinning labor. Considering that there is always a fluctuation of at least 25 per cent below or above an average figure, the present contracted thinning costs in relation to income are very near a repetition of the same relationship that prevailed the past four years; that is, a little in excess of one ton of beets paid the thinning costs on one acre. The same weight of beets or a very slight increase, it appears, will do it in 1943.

LOOKING INSIDE A WILTING BEET *

Water Competition Between Parts of Exhausted Plant Causes Serious Shock from Which Apparent Recovery Is Misleading

If you could look inside a wilting beet plant, you could observe how the plant is trying to protect itself against death. Unable to get more water from the soil, it is, in effect, shutting itself up, trying its best to hold what water it has. A struggle occurs within the plant itself. Strong parts of the plant try to take water from weak parts. There are thousands and thousands of little cells, little life units, all struggling for survival. Presently the whole leaf structure begins to collapse.

Upon application of water an exhausted plant may appear to recover quickly, but damage has been done and growing time lost. Water encounters many resistances in traveling from the roots to the leaves, even where the plant is adequately supplied and is growing normally. In exhausted plants the water has even a harder time, and it does its work slower.

What are these resistances to water? First, water meets with resistance in its passage through the soil; then again as it enters the root; and later as it passes through the soft cellular substance of the root into the vessels of the root, stem, and leaves. Finally there is a resistance in the passage of water from the vessels of the leaf into the cells, and from cell to cell, because a majority of the cells are not directly connected to the vessels. It has been shown that these resistances to the flow of water through the plant may themselves give rise to a deficit of water.

If this goes on in normal plants, consider the condition when the plant is so far exhausted that it can no longer draw water from the soil particles. Water continues to leave the plant, but little or none is coming in. The leaves, which transpire most rapidly, show the greatest water deficit. Also the leaves have the greatest suction power, and draw water from other parts of the plant.

Experiments have shown how the young leaves take water from the older, then take water from the growing points of the stems and from the absorbing region of the roots. Consequently many of these parts, though not transpiring themselves, are largely deprived of water. Certain tissues are so sensitive to water shortage that they are permanently injured and often die, although the plant as a whole continues to live after a fashion.

So it is seen that prolonged wilting leaves a lasting effect on the plant, even if the plant seems to recover when water is applied. Recovery, however, is very slow. Often new root hairs or even new rootlets have to be developed. Plants which have gone through this exhaustion are deficient in growth and final yield, as compared with normal plants.

For this reason, Look Ahead! Anticipate the need for water.

REMEMBER how slowly the water works EVEN AFTER YOU PUT IT ON

*From "Through the Leaves," published by the Great Western Sugar Company.

METHOD OF FEEDING SILAGE *(Continued from page 25)*

experiments. Different amounts of the silages were also fed in the different experiments. Milk samples were collected from each cow. A composite sample was prepared for each group by mixing the mlik of the different cows in proportion to their production. Duplicate portions of the composite samples of milk from each group were then placed in random order with the control samples and scored for flavor, as unknowns, by two judges. The summary and conclusions drawn from the fourteen feeding trials are as follows:

SUMMARY AND CONCLUSIONS

1. When cows consumed from as little as 5.5 to as much as 50 pounds of beet-pulp silage five hours before milking, both judges detected feed flavor in the duplicate samples in every instance.

2. A definite and objectionable feed flavor was detected in every sample of milk produced when the cows consumed from 30 to 50 pounds of silage five hours before milking.

3. When 50 pounds of silage was consumed by the cows immediately after milking, feed flavor was not detected in the milk that was drawn at the next milking period—that is, 10 to 12 hours later. Usually, the most convenient method of feeding beet-pulp silage is to place it before the cows immediately after milking.

4. There appeared to be no important differences between the various silages in influencing the flavor of milk.

5. The control cows were kept in the milking barn along with the experimental animals and in no instance did the control milk samples show feed flavor. This is evidence that the odor of the beet-pulp is not absorbed from the atmosphere sufficiently to be of importance in causing feed flavor in milk.

6. When milk showing beet-pulp flavor was pasteurized, the flavor score was improved as much as 0.5 to 1.0 point when the score card allowing 25 points for perfect flavor was used.

The authors wish to express their appreciation to the Animal Husbandry Division for providing the animals used in these experiments.

* R. D. Jones, Spreckels Sugar Company, Woodland, California. Private communication.

BEET TOPS MAKE TOP BEEF

By REUBEN ALBAUGH, *Assistant County Agent, Monterey County, California*

Sugar beet tops have a high feed value when fed to livestock. They probably furnish the cheapest form of roughage feed for cattle and sheep that is produced in any of the western sugar beet growing areas. According to chemical analyses, as well as feed tests, their feed value is very similar to that of alfalfa hay. They are low in phosphorus, but this deficiency can be corrected by adding to the ration steam bone meal at the rate of one-tenth of a pound per head per day.

30

It pays to shock and carefully conserve beet tops, as their present feeding value is approximately $35.00 per acre.

Green tops from a field of sugar beets that will produce 10 tons of beets per acre are equal in feed value to 1.6 tons of alfalfa hay or 1.1 tons of rolled barley. Figures obtained in the Salinas Valley where sugar beet tops were pastured by cattle indicate that the tops from a 16 ton crop of beets will produce 125 pounds of beef per acre in 90 days. Beet tops supply about three times as much feed value from a crop of beets as the wet pulp from the same crop.

There are three ways to handle beet tops. One is to pasture in the field; another is to cure the tops and haul them and stack them; and the third way is to make them into silage. The common practice of allowing beet tops to dry out with the sun and wind is a costly one. Where practical, beet tops should first be piled in small piles and then allowed to cure. In this way they will produce about twice the amount of beef as where they are allowed to bleach and dry out. In making silage from beet tops, one should haul them green, avoiding as much dirt as possible, and stack them carefully on top of the ground. The tops need not be chopped. They pack sufficiently well and contain enough sugar to make excellent feed when handled in this manner.

31

Baling tops on the Neilson Ranch southwest of Woodland. The tops are shocked, and hauled to piles from which they were baled.

When it is known that there are over one million acres of sugar beets grown in the United States and that every ton of sugar beet tops is equal to one ton of alfalfa hay, the importance of this crop as a feed during times when roughages are short can be easily seen.

Sugar beet tops have a fertilizing value when disked and plowed into the soil but their feed value for the production of meat and milk in many cases is twice what the fertilizer value would be.

GROWERS APPROVE SEGMENTED SEED

By CHAS. L. PIODA, *Rresident Manager, Spreckels Sugar Company*

No innovation in sugar beet agriculture, since the advent of resistant beet seed, has been so universally accepted by the sugar beet growers and beet sugar companies of the United States from Michigan to California as the development and use of segmented seed.

Resistant seed provided means by which the sugar beet growers and sugar companies west of the Rocky Mountains were enabled to insure the stability of their industry by minimizing the damage done by curly top or beet blight. However, the process of producing this seed for commercial planting after its first release by the U. S. Government in 1931 took time, and it was not until 1937 that it was used to plant the greater portion of the Western United States beet area.

On the other hand, segmented seed was first experimented with in 1941 and at this writing, in the spring of 1943, it is estimated that 400,000 acres, or about one-half the United States 1943 beet acreage, will be planted with segmented seed. It is expected that in California considerably in excess of 50 per cent of the beet acreage will be planted with segmented seed.

The reason for this is that seed segmentation is purely a mechanical operation; any variety of beet seed can be processed in the same manner and the resulting seed will be uniform in size. Also, once planters are properly adjusted, a more uniform job of planting can be done than with whole seed.

In spite of the short period of experimentation with this seed, its practically universal adoption by the industry indicates the desire of all concerned to find means to escape the labor difficulties with which it has been beset. The shortage of man power is the greatest hurdle a beet grower has to surmount, and the use of segmented seed offers a means of reducing man days per acre.

This seed contains so large a percentage of single germ seed balls that by planting 4 to 5 pounds per acre, the resulting stand will have approximately 70 per cent of single plants, and by using mechanical blockers, or cross blocking with cultivators, a saving in thinning and hoeing costs will be effected.

Publications of Beet Growers Associations and sugar companies alike have devoted many pages to explaining the process of shearing seed, methods of planting with single seed planters, and the opportunities offered by its use for savings to the grower.

It is recognized that stands resulting from mechanical blocking may not be as even as from careful hand thinning, but if the population of beets is equal, the resulting yield should be practically the same.

NEW METHOD OF APPLYING ANHYDROUS AMMONIA

By GEO. P. WRIGHT, *District Manager*
Spreckels Sugar Company

The use of anhydrous ammonia is not now restricted by the Government, consequently sugar beet growers who require nitrogen fertilizer can make use of it in place of restricted materials.

There has been a large amount of anhydrous ammonia used for sugar beet fertilization during the past few years. The usual method of application has been to place the cylinders on the bank of the irrigation ditch and introduce the material directly into the stream of irrigation water. The anhydrous ammonia was immediately taken up in the water and fed into the soil for plant use.

Experimental work carried on in the Salinas Valley this year by Mr. Haven Levitt of Shell Chemical Company indicates that anhydrous ammonia can be very successfully used for sugar beet fertilization by direct application to the land. Strip fertilization by this method in sugar beet fields previous to planting now definitely shows an increased growth of plants and much better color of leaves.

The method of application is very simple. The anhydrous ammonia cylinder is mounted upon the frame of a cultivator and the discharge pipe connected to a ¼ inch pipe which is fastened to the back of a ⅝ inch chiselpoint.

32

Anhydrous ammonia applied. No fertilizer.

On the bottom end of the ¼ inch pipe is an orifice which regulates the amount of discharge of anhydrous ammonia. The chiselpoint is run from 5 to 6 inches into the land so that the material is discharged into the soil at that depth. The amount of material to be applied can be accurately gauged by a simple regulation of the orifice.

There has been sufficient experimental work on this direct method of application to prove definitely that there is very little loss of material by escape into the air, and that the anhydrous ammonia is quickly absorbed by the soil for use by the growing plants.

The photograph below clearly shows an improved foliage growth on the left and a definite closing of the rows by foliage, while on the right this is not the case.

RETURN SEED BAGS FOR CREDIT

EMPTY 100 POUND BAGS WORTH $1.00 EACH

War conditions make it impossible to purchase burlap for beet seed bags this year. To assure the return of these bags, so there will be containers available for the sacking of the seed produced this year, the Company has found it necessary to make a deposit charge of $1.00 per bag for the large size bags used to issue whole beet seed.

The Company will retain title to all bags containing this seed which are distributed to growers and when such bags are returned in good condition to the Company, the grower's account will be credited for the amount of the deposit charge. We feel sure that all growers will recognize the urgency of this emergency situation and will cooperate by taking special care that the bags are maintained in good condition and returning them to the Company.

Suggestions offered by the U. S. Department of Agriculture for taking care of bags were published in the July, 1942, Sugar Beet Bulletin on page 48. Growers who follow these suggestions and return their bags will not only aid in relieving the present drastic shortage of burlap, but will profit financially thereby.

Sheared seed this year was issued in second hand burlap bags, each holding 50 pounds, for which no deposit charge was made. It is important also that these bags be returned in good condition as it will be necessary to re-use them in another year for the distribution of sheared seed.

ADDITION TO AGRICULTURAL STAFF

The Spreckels Sugar Company is pleased to announce that Mr. B. H. Benidt of Washington, D. C., will join the staff of the Agricultural Department about July 1st, as Special Assistant to General Agriculturist.

Mr. Benidt was born on a farm in Roberts County, South Dakota. He worked on his father's farm until July 1931, and attended the North Dakota State Agricultural College at Fargo, North Dakota, from which he graduated that summer with a degree of Bachelor of Science in Agriculture. In July of the same year he joined the United States Tariff Commission, with which he was connected until August of 1933. Most of his work with the Commission consisted of sugar cost investigations in this country, Cuba and the Philippines.

Between August 1933 and July 1934 he served as Emergency County Agricultural Extension Agent at Watertown, South Dakota, leaving this work to join the Sugar Division of the Agricultural Adjustment Administration, Department of Agriculture, in Washington, D. C. During the next eight years, the last five of which he was Head of the Sugar Beet Unit of the Sugar Division, he aided in the administration of the sugar programs authorized by the Jones-Costigan Act of 1934 and the Sugar Act of 1937. Since October of 1942 he has been employed by the Office for Agricultural War Relations on food allocation problems and on programs designed to help obtain materials and facilities for farmers and food processors.

Spreckels SUGAR BEET Bulletin

PUBLISHED FOR CALIFORNIA SUGAR BEET GROWERS BY THE SPRECKELS SUGAR COMPANY

Vol. VII JULY 1943 No. 7

PROGRAM MAKES PROGRESS

By W. C. WATERMAN, *Agricultural Superintendent*

The Spreckels Sugar Company has made extensive preparations to assist growers in meeting the exigencies of a labor shortage in the 1943 sugar beet crop. This program includes:

The development and use of segmented seed.

The purchase of mechanical cross-blockers.

The importation of Mexican Nationals.

Purchase and construction of mechanical harvesting equipment, such as toppers, plows, and cross-row loaders.

The plantings of segmented seed have been quite satisfactory through the months of January, February, March and April. However, twenty-five days of strong winds in May caused a heavy percentage of replanting with both segmented and whole seed. Growers are generally agreed that segmented seed materially aids the laborer to perform a better quality of work at a higher rate of speed than normal due to the large number of single beets growing in the beet row. Further experience is necessary to determine the minimum pounds of seed per acre that can be planted safely under normal conditions and still obtain a satisfactory stand.

Many fields are being thinned and hoed with long handled hoes in one operation for approximately the same cost as the rate for thinning by contract price. It is planned to make additional refinements in the process of preparing segmented seed.

Sufficient numbers of Mexican Nationals were imported to provide an ample supply of labor for all thinning and hoeing operations. As a result, a relatively small acreage of beets has been cross blocked. However, some acreage has been blocked with the Dixie Beet Chopper, whereby an average stand of 150 beets per 100 feet of row, with 60 single beets was obtained. The machine was adjusted to leave 1½ inch blocks on 5 inch centers. The prethinned stand contained an average of 35 beet-containing inches in 100 inches of beet row. This type of cross-blocking lends itself readily to a final dressing-up with the long handled hoe. It would not be seriously detrimental to the final yield if this type of stand were maintained without any additional hand work other than the hoeing operation to remove weeds.

Under normal conditions the short handled hoe can be eliminated by using the combination of segmented seed and mechanical cross-blocking. The exception to this is in the peat soils where the ground is too loose to permit the knives to cut close to the beets.

The Mexican Nationals have proven quite successful this year. They are, for the most part, from the agricultural districts of Mexico where they are accustomed to hard labor and are readily adaptable to sugar beet work. The majority of them expect to earn sufficient money while here to improve their home conditions. As a result, they are anxious to work as many days as possible, and to perform in a manner satisfactory to their employers.

The willingness of the Mexican National to respond to supervision has resulted in a superior quality of work being done in thinning and hoeing, which has been reflected in materially lessened cost of this work as compared with the performance of many crews of domestic Mexicans previously classed as experienced beet workers.

The combination of Mexican National labor and the harvesting machinery now under construction should provide a sufficiently workable program to enable growers to complete their harvest at a reasonable date.

COSTS CUT WITH DIXIE THINNER

By RALPH LAMBDIN, *Asst. Agricultural Superintendent*

One of the growers in the Gonzales area during the past thinning season demonstrated the value of mechanical blocking under the proper conditions.

Blocked—Cost Per Acre

Blocking cost (approximately)	$ 1.90
Thinning at 65 cents per hour	18.00
Hoeing at 65 cents per hour	9.00
Total cost	$28.90

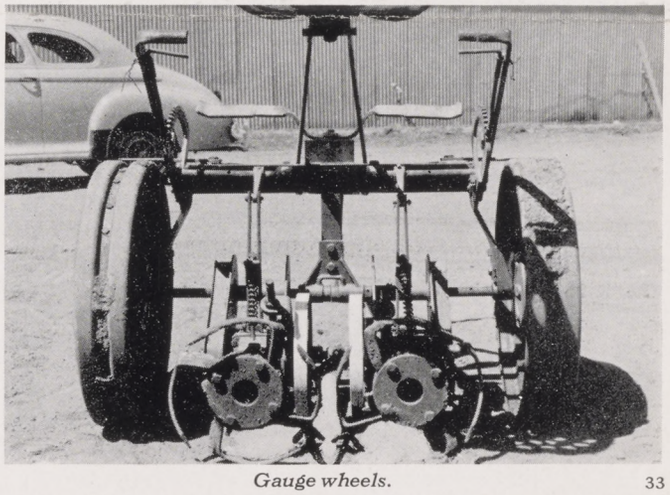
Not Blocked—Cost Per Acre

Thinning by contract	$17.50
Hoeing at 65 cents per hour	15.00
Total cost	$32.50

The hourly work was all done by the same crew

This field was planted with sheared seed at the rate of approximately 5 pounds per acre, during February. It was thinned April 10. Stand counts show a larger number of beets per 100 feet were left in the blocked area.

The Dixie Beet Thinner used in this field was equipped with gauge wheels designed by W. Rhyner of the Spreckels Sugar Company. (See photograph.)



Gauge wheels. 33

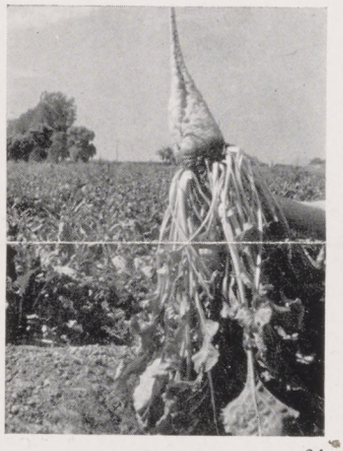
Dixie Beet Thinner, equipped with gauge wheels, designed by W. Rhyner of the Spreckels Sugar Company.

HARVEST MACHINERY DEMONSTRATION

IMPERIAL VALLEY

By A. C. BULLEN, *Engineering Department*
Spreckels Sugar Company

A demonstration in the Imperial Valley of some of the mechanical beet harvesting machinery, which the four California beet sugar companies are financing for the use of their growers this 1943 season, was arranged May 1, 1943, by C. A. Lavis of the Holly Sugar Corporation.



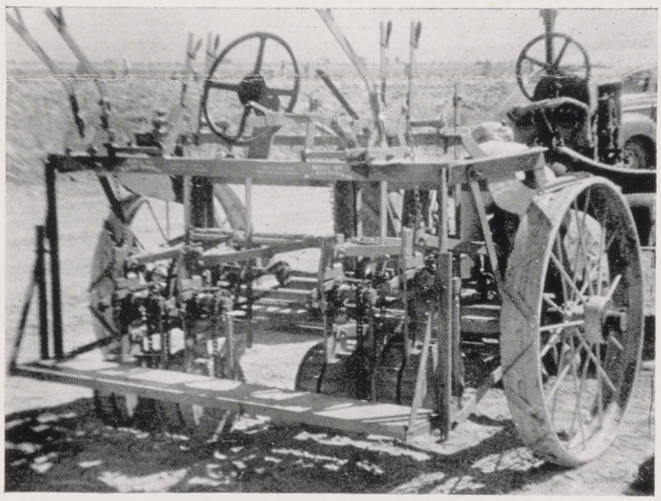
34

Fig. 1.—Imperial Valley sugar beet.

Figure 1 shows the heavy foliage typical of the beets in this district and an average beet picked at random. This beet was easily pulled up by hand from moist soil and came out as clean as the picture indicates.

The first machine to be tried out was the newly designed Zuckerman 4-row variable cut beet topper. The improvements made in this latest model, shown in Figure 2, include a lighter weight streamlined machine with the wheels and axle moved to the approximate center of gravity, which permits easier handling when connecting to the tractor. The center positions of the four knives are made adjustable to accommodate variable planting from flat bed at 20 inch centers to bed planting at 13 and 27 inches, or any desired spacing between. The carriage wheels are adjustable from 82½ inches to 88 inch tread.

One trip of the topper across the field and back, topping 8 rows, proved that the change in the frame design has in no way impaired the machine's ability to provide satisfactory variable cut topping with no interference from heavy foliage. Its increased simplicity and balance are definite advantages.



35

Fig. 2.—Improved Zuckerman 4-row topper.

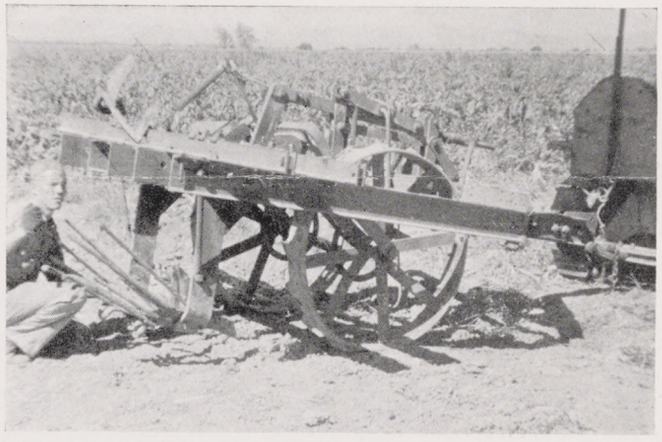
The next unit to be tried out was the Devey two-row disc topper shown in Figure 3. In this topper the disc assemblies are mounted directly on the rear end of a light tractor with V-belt drive through gear boxes to the disc shafts. The action of the disc topper is to throw the tops to one side, thus leaving the beets exposed, ready for plowing without having to dispose of the tops.

36

Fig. 3.—Devey 2-row disc topper in action.

In the case of the 4-row topper, it is necessary in the northern California district, where the tops do not wilt readily, to remove them with a side delivery rake, or other means, before following through with the harvester or plow. A few hours after topping in the Brawley district the leaves were wilted to practically nothing and this shows conclusively that no leaf disposal equipment will be required under these conditions in so far as the beet harvesting is concerned.

However, it is anticipated that the stock feeders' demand for more beet top silage feed will induce the beet growers to increase their efforts to salvage beet tops. It has been demonstrated that an acre of beet tops in silage, from a crop of 15 tons per acre, is equivalent to one ton of alfalfa hay. For this reason, the Spreckels Sugar Company is constructing a top and leaf harvester for experimental purposes during the early part of the coming harvest.



37

Fig. 4.—Improved Hunt 2-row beet lifter.

The next unit tried out was the Hunt plow, shown with shares and their tail rods above ground in Figure 4. This

(Continued on next page)

HARVEST MACHINERY (Continued from page 30)

machine is a two-row beet lifter plow, the tail rods used to bring the beets to the top of the ground. Figure 5 shows the results of this unit plowing and lifting from one bed of two rows. Where the soil breaks up into large lumps some of the beets are more or less covered, which retards the speed of the loading crew in following operations.

Finally, the "Armer" loader was tried out with the only "high-class" labor available at the time, as shown in Figure 6. This loader was fully described in the May, 1943, Spreckels Bulletin and reference thereto is made for a complete description of it.

38

Fig. 5.—Beets lifted with Hunt plow.

Later tests with this loader conducted at Brawley, and reported by Mr. Andy Logan, show some results as follows:

Three tests using 5 men loading from 6 rows: 1.55 tons per man hour (1.66 maximum).

One test using 3 men loading from 4 rows: 1.43 tons per man hour (1.45 maximum).

Two tests using 6 men loading from 6 rows: 1.54 tons per man hour (1.62 maximum).

Average yield was 18.82 tons per acre.

39

Fig. 6.—"White collar" labor tries hand at loading beets on the Armer Cross Conveyor.

MOISTURE DETERMINATIONS ESSENTIAL

By GUY D. MANUEL, *Asst. Agricultural Superintendent Spreckels Sugar Company*

Irrigation has always been considered one of the most important operations in producing a maximum crop, and also one that is most apt to be neglected of all the farming operations. Because of its importance the Spreckels Sugar Company has developed an irrigation program over the last few years to assist growers in solving their moisture problems.

Work has been done on moisture holding capacity of soils over a large portion of the sugar beet producing area of this company and the results will be a helpful guide in planning irrigation for this season. A considerable amount of preliminary electrical moisture testing has been done but as yet this has not developed enough to be widely used in the field.

In the Sacramento District during the present season the irrigation program will be as widespread and intensive as is possible under wartime conditions. The Company Field Men will work with the growers and through sampling with soil tubes and running of moisture percentages, recommendations on irrigation based on accurate data can be given. Growers who are in doubt, or have any suspicions of abnormal conditions, such as high water tables or lack of penetration, should contact their Fieldmen and go over their fields with them.

Irrigating any crop from observation of its appearance only has long been a practice of some farmers, but in a number of cases, especially with sugar beets, erroneous judgment is often the result. The only sure way of planning irrigations is to know the actual moisture condition of the top 4 to 5 feet of soil, and if growers will do this, using the aid given them by their Fieldmen, it will assist in realizing maximum production.

BRIEF NOTES ON INSECTS AND DISEASES FOUND IN NORTHERN CALIFORNIA BEET FIELDS

By E. A. SCHWING, *Entomologist*

The *beet leaf hopper* (Eutettix tenellus, Baker) was and could be the most important insect in this area. The control of this pest is now largely confined to the control of the host plant, Russian thistle, in the San Joaquin Valley. By keeping down this host plant, using resistant varieties of seed, and following up by a small amount of spraying in the foothills, the damage from Eutettix tenellus to the sugar beet crop has been kept at a minimum.

The *armyworm* does very little damage in most years. Occasionally an outbreak affecting from 200 to 2,000 acres of sugar beets in Northern California occurs. The yellow striped armyworm (Prodenis praefica, Grote), and the beet armyworm (Laphygma flavimaculata, Harvey) are the chief offenders. There are usually three broods a year. The second brood appearing in late June or early July is the one that does the damage. The first brood in April or May can be controlled by a poison bait (see cutworm control) or by dusting with Cryodust on ditch banks and fence lines. The second brood can be controlled by the application of 20 pounds of "Cryodust 40" to the acre. This material consists of 36% sodium fluoaluminate and 64% inert. The fluorine content is 19.55%. Arsenical sprays or dusts are also effective.

The *garden webworm* has occurred during the months of June and July in very minor areas. Cryodust 40 at the rate of 20 pounds per acre proved effective while the worms were small and before the webbing was pronounced. No test on older worms has been tried.

The *cutworm,* variegated (Lycophotia margaritosa,

(Continued on next page)

INSECTS AND DISEASES (Continued from page 31)

Haworth), and greasy (Agrostis ypsilon, Rottemburg) usually has two broods. The brood that appears in March or April on sod lands, or slightly later on winter flooded lands, is the one that is controlled. The use of one quart of sodium arsenite to 25 pounds of bran and sufficient moisture to make a workable mash is the material that is used to control. It is broadcast at the rate of 20 pounds per acre. In some areas in the San Joaquin eggs laid on green fall material have hatched out in January.

The *black bean aphid* (Aphis rumiscis, Linnaeus) appears to a more or less extent each year. Host plants such as horse beans, bell beans, rape or garden beet seed in the vicinity of sugar beet fields are watched. The aphis should be controlled on these host plants, if possible, as this is the cheapest method. If necessary, the sugar beets are sprayed with nicotine dust at the rate of 40 to 60 pounds per acre. Rotenone dust has also been used with success.

The *wireworm* (Limonius Californicus, Mannerheim) usually works in March, April, and May in northern California. As light sandy soils are the worst infested, these should be planted as early as January. Extra seed is planted and thinning is delayed as long as is possible. The use of seed treated with dichloroethyl ether dust and the drying up of the upper soil by using discs close to the beet rows to force down the wireworm has been tried and is suggested as a possible aid.

The *small black blapstinus beetle* (Blapstinus fliginosus) has damaged hundreds of acres in some years on dobe "buck shot" type soil during May and June. The use of the grasshopper or cutworm bran mash bait has been successful in controlling this pest.

The *false chinch bug* (Ericae minutus) can breed up to enormous numbers on rubbish heaps near barns or in ripening grain fields. They can be killed by spraying with kerosene, burning waste areas, or by the use of trenches with road oil and trapping in holes at intervals. Direct spraying with "Black Leaf 40," one pint, five pounds of soap, and 100 gallons of water on sugar beets is also effective.

The *western flea beetle* (Hemiglyptus basalis (Cr.) occurs in many fields in California, but the damage to the leaves seldom justifies control. It can be controlled by the use of an arsenical dust. "Cryodust 40" could be tried out in place of the arsenicals.

The *sugar beet root aphid* (Pemphigus betae, Doane) is often a serious factor in some areas, especially in dry years. If in plowing the farmer turns over much soil that is infested, a winter flooding is desirable to reduce numbers. This should be followed by crop flooding as early as possible, before the aphids have stripped off the feeder roots. These practices are advisable as no adequate direct control has been developed.

The *adult cucumber beetle* (Diabrotica soror, Leconte) causes considerable damage on limited acreages in some years during late spring or early summer. This damage can be prevented by watching ditch banks and fence rows and by treating these areas with kerosene spray. On the beets a sodium fluosilicate at the rate of 20 pounds per acre is used successfully.

Thrips (Heliothrips fasciatus, Pergande) occur late in the season on dry areas. Proper irrigation should prevent unusual development of thrips. Spraying with pyrethrum sprays should help reduce numbers.

Grasshoppers (Melanoplus devastator, M. femur-rubrum, M. differentialis, and M. bivittatus) develop in waste areas, in unplowed areas, or in alfalfa fields. From these areas they move into the beet fields. Nymphs can be prevented from reaching beet fields by the use of trenches with road oil and the use of grasshopper bait, scattered at the rate of 20 pounds per acre.

The *sugar beet nematode* (Heterodera schachtii) is taken care of by proper crop rotation and disinfection of beet implements.

The *garden nematode* is very difficult to keep under control as it attacks such a large number of crops. A rotation limited to such crops as field corn, Milo maize, barley, wheat and asparagus, should reduce the infestation so that susceptible crops can be raised. Susceptible crops should not be raised more than once in four years.

The *garden centipede* is found in a few locations and is usually severe wherever it occurs. Centipede areas should be avoided as far as sugar beets are concerned.

There are a number of diseases of the sugar beet. Pythium and Rhizoctonia of the soil borne organisms and Phoma of the seed borne organisms are largely prevented by treating 100 lbs. of whole seed with one pound of Ceresan, or six ounces of New Improved Ceresan. In the case of sheared seed, 1½ pounds of Ceresan or 8 ounces of New Improved Ceresan are used.

Sclerotium rolfsii, or Southern root rot is reduced by rotating crops and making soil counts to prevent planting dangerous ground.

Beet mosaic is a virus disease caused by an insect. No control has been attempted as it is not severe enough.

"Curly top" is a virus disease caused by Eutettix tenellus. As the leaf hopper is controlled, this disease is not important any longer.

Leaf spot has appeared in some of the northern areas. Resistant varieties are being planted to correct the ravages of this disease.

Downy mildew is another disease that is very serious at times. Resistant varieties are being developed to combat this disease.

Tip burn is usually attributed to too fast growth and to probable insufficient plant food.

"Bronzing" occurs in the Delta region. The cause is unknown.

Rust appears occasionally. No attempt is being made to control this disease as it is not considered to be important enough.

"Water mold" occurs in slightly acid or neutral soils in the Delta and is most destructive under moist conditions after the soil is fairly warm. Seed treatment does not control this disease, but early planting avoids infection.

DIXIE BEET THINNER SAVES GROWER MONEY

By J. B. LARSEN, *Agricultural Department*
Spreckels Sugar Company

One grower in the King City area usually plants 8 to 15 acres of sugar beets each year. This year he has 14 acres. Labor demanded $14.00 per acre to thin his beets. He planted sheared seed and figured their demands were out of reason. So he used one of the Spreckels Sugar Company's Dixie beet thinners instead. Wire worms had hurt his stand in a few spots in his field. When he came to these spots he raised up the choppers. This grower always hoes his own beets. This year he is taking out what doubles the blocking machine left as he hoes. As well as saving $14.00 per acre, he has a better thinning job than he has ever had before.

Spreckels SUGAR BEET Bulletin

PUBLISHED FOR CALIFORNIA SUGAR BEET GROWERS BY THE SPRECKELS SUGAR COMPANY

Vol. VII AUGUST 1943 No. 8

AUSTIN ARMER TO HEAD SPRECKELS FARM MACHINERY PROGRAM

Austin A. Armer, new Agricultural Engineer, Spreckels Sugar Company.

Austin A. Armer, Associate Agricultural Engineer, Bureau of Plant Industry, Soils and Engineering, U. S. Department of Agriculture, became a member of the staff of the Agricultural Department of the Spreckels Sugar Company July 26, 1943, and will head the company's farm machinery program.

Mr. Armer is a graduate of the University of California and holds both the degree of Bachelor of Science and Master of Science. On graduation from college he joined the engineering staff of the Magnavox Company at Oakland. His work in the design and application of electrical specialties took him to the radio and automobile manufacturing centers of the Middle West and for a while he was stationed at Detroit, Michigan.

In 1939 Mr. Armer became Research Associate in the Agricultural Engineering Division of the College of Agriculture at Davis, California, where he was assigned to the development of sugar beet field machinery.

In 1942, although continuing his work on the same projects, he became affiliated with the U. S. Department of Agriculture as Associate Agricultural Engineer with the Bureau of Plant Industry, Soils and Engineering.

Mr. Armer is married and has three children, and will continue to make his residence at Davis, California, at least for the time being.

In the years Mr. Armer has been working on sugar beet machinery, he has demonstrated his ability not only to analyze problems from an engineering viewpoint, but has continually kept in mind the practical problems involved in the work in which he was engaged.

The complete utilization and perfection of sugar beet machinery at this time is of vital importance to the sugar beet industry. The Spreckels Sugar Company believes it can best assist beet growers in this program by having a man with the training and experience possessed by Mr. Armer to head its work on beet machinery.

UTILIZATION OF BEET HARVESTING MACHINERY

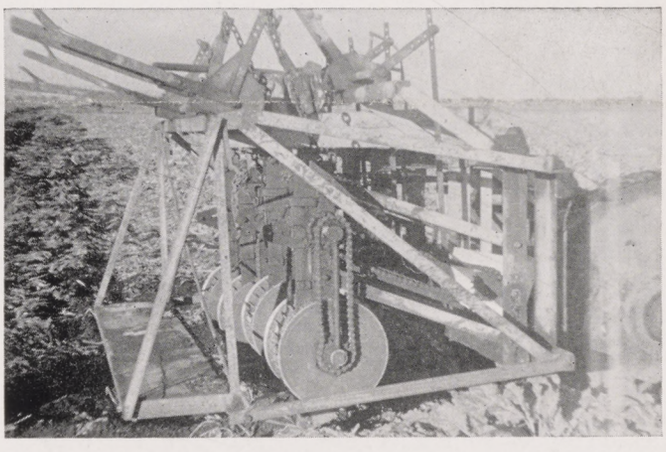
By J. E. COKE, *General Agriculturist*
Spreckels Sugar Company

The beet harvesting machines ordered by the Spreckels Sugar Company are now being manufactured and it is fully expected that all the units will be ready prior to the start of harvest. It is recognized that these machines are not a complete answer to the total mechanization of beet harvest. Their use, however, will not only reduce the amount of labor required for harvesting beets, but will eliminate some of the more laborious jobs, thus making sugar beet harvesting more attractive to laborers.

It is also fully recognized that not only to obtain full utilization of the equipment but to bring about improvements in the equipment will require the cooperation and ingenuity of beet growers as well as the agricultural staff of the Spreckels Sugar Company. With this cooperation, we believe the 1943 harvest will result in greater mechanization of sugar beet harvest than has taken place in any previous period in the history of the industry.

The rental charges during 1943 for the use of the Spreckels Sugar Company's beet harvesting units are as follows:

1. *Four-row toppers.* Spreckels Sugar Company is having manufactured thirty 4-row patented Zuckerman topping machines. These will be available to beet growers at a rental charge of $1.00 per acre. The machine can travel at the rate of approximately two miles per hour, and, based upon an 80 per cent operating efficiency, will top 1.3 acres per hour.



4-row patented Zuckerman topper, having the variable cut feature. This unit is tractor drawn. The knives follow the beet rows irrespective of the alignment of the machine carriage with the hauling truck.

For more complete description of this and other machines listed below, we refer you to the article by A. C.

(Continued on next page)

BEET MACHINERY *(Continued from preceding page)*

Bullen entitled "Beet Harvesting Machinery for 1943" in the March, 1943, Spreckels Sugar Beet Bulletin, p. 11.

2. *Cross-conveyor loaders.* Thirty-five 20-row lettuce-type cross conveyor loaders are being manufactured for the company. The cross conveyor is self powered and is mounted and balanced on its own truck chassis. The truck is equipped with a special low ratio transmission in order that the speed of forward travel may be suited to the capacity of the workers behind the conveyor. The rental charge for the use of these units will be 25 cents per ton.

It is estimated that in average beets a single man can load beets, which have been topped and plowed to the surface, at the rate of 1 ton per hour or can top into the cross-conveyor at the rate of ¾ ton per hour.

20-row self-powered cross-conveyor loader mounted and balanced on its own truck chassis.

3. *4-Row beet lifter.* There are being manufactured twenty 4-row beet lifters of the Alvos type, for which the rental charge will be 35 cents per acre.

The plow is a two point Colorado type, equipped with Alvos lifting bars, which bring the beets to the surface and leave them in a uniform position with all the tails trailing.

Experience indicates that this plow can travel as fast as the topper, so that its capacity is comparable with the topping unit.

4-row Alvos type beet plow, showing tail rods.

4. *Marion beet harvester.* The Spreckels Sugar Company has ordered three Marion beet harvesters, for which a rental of $1.00 per ton will be made. This harvester is a complete unit, which will plow, lift, top, and elevate beets to the truck in one operation.

Experience with the machine thus far has been limited to peat soils. Attempts will be made to use the machines on sedimentary soils this year to determine its adaptability for use under sedimentary soil conditions.

5. *Miscellaneous equipment.* A few side delivery rakes, leaf harvesters, and beet loaders are being manufactured. No rental charge will be set for these machines until their usefulness has been determined.

Growers desiring to use any of the harvesting equipment listed above should contact the company's field superintendent in their district.

A PLEA FOR MECHANIZATION

By AUSTIN ARMER, *Agricultural Engineer*
Spreckels Sugar Company

The subject of mechanical aids to growing and harvesting sugar beets is probably the most discussed phase of the entire sugar beet program—and not without reason. The beet grower is in the unique position of knowing before planting time the price he will receive for each ton of beets harvested, but pretty much in the dark when it comes to estimating how much it will cost to grow and harvest that ton of beets. A few years ago he could make a safe guess because labor was stable and rates dependable. Since the onset of war such guesses have become dangerous and it behooves the prospective grower to plan the production of his crop with consideration for every known cost and to use keen judgment in predicting the unknown quantities of labor availability, quality, and cost.

Mechanization offers an opportunity to change some of those unknown quantities into tangible figures. But at this writing, mechanization is not complete. There are mechanical aids available which were not in use a few years ago. These have had enough use in the field to prove their worth. To list a few, we have segmented seed, low planting rates and mechanical blocking. That is a combination which has been proved on thousands of acres, and which not only shows a marked saving in man hours, but a reasonably predictable cost. We have, in addition, cross-row loaders, which may be used with hand topping crews and which show a saving in man hours. Because they set a uniform pace for the toppers, they contribute to an accurate prediction of harvest costs. When these loaders are used with mechanical toppers and suitable lifters, the hand labor is still further reduced and the harvest cost still more accurately predictable.

From these examples it becomes evident that mechanization has two virtues. It reduces labor requirements, and it helps the grower to know his costs in advance of planting. If it were possible to state exactly how much saving can be expected from a mechanization program, there would be no need to plead for mechanization. But until more experiences accumulate it is unsafe and misleading to assign dollars and cents values to the cost savings. We must be content with the assurance that the mechanical aids have real value.

The 1943 harvest season has arrived. It finds a few growers prepared for mechanical harvest, others tackling it experimentally, and still others trusting in the "Old Fashioned Way." It is doubtful if a single member of any of these three groups would deny the values of mechanical aids, yet, collectively, only a fraction of them have sincerely investigated the possibilities of mechanization. Perhaps that is only natural. Perhaps the growers who have mechanized are only gadget-minded mechanics who exercised their hobby. Perhaps the majority have the attitude

of letting the other fellow do the costly experimenting while they play safe. But this writer's hat is off to the grower who says "I believe in mechanization. I don't expect any machine to be perfect, and it may look hopeless when I try it the first time. But I will use it, get acquainted with its good and bad points, and before long, I'll make it work!"

TRUCKS MUST SAVE OUR CROPS

By R. F. WALKER, *Traffic Manager*
Spreckels Sugar Company

The harvest season is almost upon us, and on or about the first of September the beet trucks will begin to move to the loading dumps and factories. It is of the utmost importance that when harvest begins these trucks be in serviceable condition and ready and able to haul their loads without interruption.

Breakdowns during harvest this year will be doubly serious. Beet hauling will begin at the peak of the general crop movement when every available truck will be operating at capacity. The existing shortage of repair parts and competent repair men will be intensified by an increased volume of emergency maintenance and repairs. The rationing agencies and tire men will be swamped with emergency requests, and applications for additional gasoline, tires, and tire repairs will probably be subject to serious delay. All repairs and adjustments needed by trucks or tires should be completed immediately. Special care should be given to the small troubles which, if neglected, will eventually cause a major breakdown which might tie up the truck for the entire season.

Our government recognizes the seriousness of the situation in California and is doing everything possible to insure against a failure of our crop transportation. You will probably be advised by the press, before this Bulletin reaches you, that the Office of Defense Transportation has been directed to administer the program growing out of the recommendations of the Downey Sub-Committee of the Military Affairs Committee concerning transportation of California crops. This program will probably involve, among other things, freezing in dealers' hands of all used trucks of a rated capacity of 1½ tons and over on the same basis as new trucks, release by the Army and Navy of contractors' trucks suitable for agricultural hauling, and any general action required to assure that every serviceable vehicle will be available for that service. The Office of Defense Transportation will have men in the field to keep in close touch with the situation from day to day. The Army, Navy, Selective Service, O.P.A., U.S.D.A. War Boards, and all other government agencies will assist in the effort to see that every available truck is in service and operating at peak capacity during the harvest season.

The crops can be moved, but only by operating the available trucks at maximum efficiency and by reducing as far as possible the emergency load which maintenance and service agencies must handle and which will reach its peak with the harvest. The grower can do his part to save his and others' crops by attending immediately to all repairs, maintenance, and ration adjustments which he may need to carry his equipment through the harvest season without interruption.

BEET SEED PRODUCTION RESULT OF INDUSTRY-BEET GROWER COOPERATION

By CHAS. L. PIODA, *Resident Manager*

In an article written by Dr. G. W. Coons,[1] reviewing the production of sugar beet seed in the United States during the past 31 years, published in the January and February issues of the magazine "Sugar", the following tabulation is included, and is here reproduced for the purpose of showing how wars and the development of domestic strains resistant to diseases have affected that vital department of the sugar industry.

"Imports and Domestic Production of Sugar Beet Seed, with Acreages of Sugar Beets Planted."

Year	*Importations for fiscal year ending June 30*	*Domestic Production**	*Acreage planted in spring of calendar year shown*
1913	14,768,207		635,000
1914	10,293,898		515,000
1915	15,882,661		664,000
1916	9,042,490	5,211,000	768,000
1917	14,469,774	5,076,000	807,000
1918	15,635,542	5,900,000	690,000
1919	986,676	6,700,000	890,000
1920	19,338,012	6,770,000	978,000
1921	19,906,906	3,575,000	882,000
1922	4,193,311	1,056,000	606,000
1923	16,494,953	**	732,000
1924	11,620,053	**	936,000
1925	14,249,938	**	781,000
1926	8,733,175	**	746,000
1927	14,516,082	**	756,000
1928	13,255,322	**	698,000
1929	14,068,107	**	772,000
1930	15,627,737	**	821,000
1931	13,438,762		760,000
1932	19,498,535	550,800	812,000
1933	15,820,000	1,411,900	1,036,000
1934	18,027,312	2,825,600	945,000
1935	11,339,191	3,880,800	809,000
1936	13,106,324	8,130,700	855,000
1937	15,138,941	12,096,500	816,000
1938	3,117,712	13,661,900	990,000
1939	6,763,243	13,853,400	1,030,000
1940	4,081,892	7,401,800	975,000
1941	Nominal	18,085,200***	795,000
1942	Nominal	18,000,000***	1,061,000

*Calendar year, hence usable for plantings in next calendar year.
**Production from stecklings; estimated at about 500,000 to 800,000 annually.
***Estimated.

This article briefly traces the part taken by the Spreckels Sugar Company in developing the sugar beet seed industry in California, and the influence of the curly top disease thereon.

As early as 1897 records show comparative tests of European varieties with beets grown from seed produced in California by J. B. Agnew in 1896. In 1898 Agnew estimated his production at 20 tons of seed.

The curly top disease was first described in 1899 by Mr. P. W. Morse, Agricultural Superintendent of the Spreckels Sugar Company, when the entire sugar beet crop on 2,000 acres planted at King City that year was destroyed.

The most notable scientists in the United States and Europe were called upon to classify the ailment and prescribe a cure, without result. Records of the Company's Agricultural Department and Experiment Station teem with descriptions of the investigations made, and means and methods used in efforts to grow satisfactory crops in affected areas.

The harmful effect of curly top on beets, as then planted for seed, made it necessary to abandon beet seed growing, although in later years some excellent seed was grown,

(Continued on next page)

SEED PRODUCTION *(Continued from preceding page)*

particularly in Washington by a man named Morrison.

During World War No. 1 seed was grown by a number of the major beet sugar companies in the United States using the steckling method, selecting beets from commercial fields and either siloing them or, as was done in California, transplanting them in early spring. By this method Spreckels Sugar Company produced a considerable quantity of seed at its various ranches in 1918-19 and 1920.

The discovery by Dr. E. S. Ball of the Department of Entomology, U. S. Department of Agriculture, of a casual relationship between the feeding of the insect Eutettix tenellus (Baker) and curly top disease was announced early in 1907, but afforded no relief to beet growers, as there was no method then known for controlling the insect.

Suggestion had been made by one or two of the early investigators of the disease that it might be possible to breed a strain of beets in which all plants would be resistant, because in a blighted field some beets were usually found that did not show its effect. Also, for other plants, strains were being successfully developed which were resistant to disease. In the fall of 1918, to test this theory as applied to sugar beets, a systematic program was undertaken by the Spreckels Sugar Company and during that fall and in following years, large numbers of such beets were selected from its beet fields near King City for the purpose of producing seed therefrom. This work was later taken over by the University of California, when positive indications of a fixed resistance in one strain was established.

Meanwhile, Dr. Eubanks Carsner of the U. S. Experiment Station at Riverside and investigators of the Amalgamated Sugar Company in Idaho had obtained equally promising results and under the impetus of these discoveries, the U. S. Department of Agriculture took over the task of developing a satisfactory resistant seed.

By the fall of 1930 the work of producing a commercial blight resistant strain had reached a point, where it was felt reasonably safe to release for commercial increase a small amount of "U. S. No. 1" seed, as it was called.

In November of that year a meeting was held at Denver, Colorado, attended by representatives of the Spreckels Sugar Company, American Crystal Sugar Company, and Amalgamated Sugar Company, the Utah-Idaho Sugar Company, Holly Sugar Corporation, Great Western Sugar Company, and Dr. Coons, to consider ways and means of accomplishing this.

The Department was unwilling to give sugar companies a free hand in propagating this seed and was not in a position to carry on the work itself, but because of the favorable experimental results obtained in blight areas through its use, the interested companies were unanimous in requesting that it be released at once, offering to finance the cost of increasing the seed, with the understanding that the Government would retain control of its increase and distribution. Accordingly, an agreement was entered into with the U. S. Department of Agriculture and one bag of "U. S. No. 1" seed each was alloted to the Spreckels Sugar Company, The Amalgamated Sugar Company, and the Utah-Idaho Sugar Company.

To cooperate with the Government in carrying out this program, the Curly Top Resistant Breeding Committee was formed at Salt Lake City. This Committee consisted of representatives of the U. S. Department of Agriculture and the interested sugar companies. Its function was to select strains suitable for various localities and to evaluate new varieties as they were developed. To aid in this work, these sugar companies have contributed financially.

Meanwhile, improvements made in the quality of the elite strains, and the development of new strains by the U. S. Department of Agriculture at its Salt Lake City Laboratories, made it imperative to broaden the scope of seed production operations and to find new growing areas where seed from strains resistant to bolting could be produced.

Other sugar companies, noting the success of the Spreckels seed producing program in California, joined it, but it soon became apparent that a permanent organization, including all interested companies, must be formed if the production of seed was to be stabilized. This led to the formation in 1936 of the West Coast Beet Seed Company with Mr. Geo. T. Scott as General Manager. Since 1936 that Company has produced nearly all the beet seed grown on the Pacific Coast.

It is fortunate for the beet growers of the United States that this organization, primarily established for producing resistant seed, was expanded to produce other varieties, because, when the importation of seed from Europe was stopped by the present war, its facilities were available to produce large quantities of high grade seed.

1.—Principal Pathologist, Div. of Sugar Plant Investigations, Bureau of Plant Industry, U. S. Dept. of Agriculture.

LATE IRRIGATION AND ITS BEARING ON HARVEST

By A. H. KAAS, *Agricultural Department*
Spreckels Sugar Company

The need for late irrigations depends upon several factors. Time of planting, disease, supply of plant nutrients, location of free water in the soil, type of soil, and harvest schedules all influence the irrigation program.

Beets planted in April and May are still growing during the fall months, and adequate moisture should be present during August and September to have ideal growing conditions for the crop. Where the beets are allowed to dry up during this period and then the moisture has come up in the soil, a renewed growth is started which continues until harvest, giving lower sucrose tests. If enough moisture had been kept in the soil, the beets would have made continuous growth and depleted more of the nitrogen in the soil giving greater tonnage and better tests.

Where fertilizers have been applied late in the season, later irrigations are necessary to allow the beet to take up all the excess plant food, as adequate moisture must be present to make the fertilizer available to the plant.

The type of soil and its location are very important in determining irrigations. Heavier soils should not be irrigated as late as sandy ones since their moisture holding capacities are higher, and too late an irrigation might make harvest difficult. If fields are near rivers or sloughs and subject to rising water table during harvest, the irrigation should be finished earlier to avoid excessive moisture conditions.

Growers with large acreages have found that their harvest schedule and irrigation program should be considered together. Some fields can be irrigated a month later than others and still be dry enough for harvest and yet have had excellent conditions for putting on added growth instead of lying dormant.

The principal concern of the grower and the sugar company is to get maximum sugar per acre and the late irrigations are important in attaining this. Growers, with the aid of the company fieldmen, should continue to observe their moisture conditions through the early fall and where needed, irrigations should be applied.

Spreckels SUGAR BEET Bulletin

PUBLISHED FOR CALIFORNIA SUGAR BEET GROWERS BY THE SPRECKELS SUGAR COMPANY

Vol. VII SEPTEMBER 1943 No. 9

BEET TOPS WORTH $21 PER ACRE AS FEED

PROPER CONSERVATION OF BEET TOPS GOOD FINANCIAL INVESTMENT AND ESSENTIAL TO WAR EFFORT BECAUSE OF ACUTE FEED SHORTAGE

By R. F. MILLER and H. R. GUILBERT, *College of Agriculture University of California, Davis, California*

The conservation and efficient utilization of sugar beet tops is especially important during these days of feed shortage. Plans are under way to use topping machines and other mechanical harvesting devices during the coming season to facilitate economical harvesting. Disposal of tops is one of the problems in some of these plans for using machinery. Mechanization is essential to economical harvesting of tops, and top removal is necessary for the best use of the machines.

YIELD AND FEEDING VALUE

The yield of moisture-free tops averages a little over 10 per cent of the beet tonnage. Based upon last year's production in California of approximately 2,300,000 tons, the dry-matter yield of tops was about 230,000 tons. About 40 per cent of the dry matter of tops is in the crowns, and 60 per cent in the leaves.

The average percentages of digestibility of tops found in trials with steers were: dry matter, 74; crude protein, 69; nitrogen-free extract, 82; ether extract, 39; and crude fiber, 75.

The digestible nutrients in 100 pounds of beet tops on a dry matter basis in a number of trials was 7 to 9 pounds of digestible crude protein and 60 to 64 pounds of total digestible nutrients. Alfalfa hay on a dry basis is about 11 pounds digestible crude protein and 55 pounds of total digestible nutrients. This speaks well for the feed value of beet tops.

A ton of beet-top silage has a feed-replacement value of about 450 pounds of barley or 700 pounds of alfalfa hay. Stated another way, the well-conserved tops from 1 ton of beets have the value of about 150 pounds of barley or 230 pounds of hay. These amounts, with a 15-ton beet yield, are equivalent to about 1 ton of barley or 1.5 tons of alfalfa hay per acre.

Yield of silage varies with the beets but for the most part should be 3 to 5 tons per acre, with an average of about 4 tons. Since complete recovery cannot be expected, 3 tons per acre may be used as a basis for estimating returns. With alfalfa hay at $20 per ton, beet-top silage has a replacement value of $7 per ton; or on a 3-ton yield, $21 per acre.

CONSERVATION

It is estimated that less than 40 per cent of the 1942 acreage of beet tops was utilized for feed. Approximately 80 per cent of the acreage pastured was used by beef cattle. The estimated average yield of beef per acre was 60 pounds. The maximum utilization by pasturing may yield about 90 pounds of beef. If tops harvested were made into silage or otherwise conserved and fed in mixed rations, the return per acre could be increased to between 150 and 250 pounds of live weight per acre.

40

Beet tops stacked on the H. T. Davis Ranch, Salinas.

The best method of conserving developed to date is stack silage. The tops should be stacked *green or only slightly wilted.* If too much moisture is lost, the tops will mold and decompose. The sides should be brought up straight, and successive layers added so that the settled stack is *at least 7 feet high.* It is extremely important to have sufficient height and weight of tops so that they pack tightly, exclude air, and insure good silage. A round top on the stack will prevent penetration of rain during the winter. Such a stack, in a trial in Monterey County, resulted in good silage when fed out nearly one year after stacking.

Loss in these stacks does not appear to be higher than in a trench silo. The use of alternate layers of straw increased access of air, with spoilage, and is not recommended.

Stacks may be placed in the feeding corral, surrounded by a manger-type fence and the silage fed off the stack. Another convenient method is to stack 2 to 3 feet away from the outside fence of the feeding corral.

One of the plans for harvesting this year involves mechanical topping of the beets, windrowing tops with a side-delivery rake attached to the topper, and subsequent plowing and loading of beets. This should make possible loading the tops either by hand or with a pick-up loader and keeping the tops reasonably free from dirt, which is very important. Other possibilities or modifications may be developed for harvesting. Without such mechanical aid the average cost estimated by 43 Colorado growers of ensiling beet tops varied from $1.75 to $8.00 per acre, and averaged $4.10 per acre in 1941.

UTILIZATION

On tops alone pastured in the field, cattle may be expected to gain 1 to 1.5 pounds daily; lambs from 0.18 to 0.22 pound daily. Access to hay or dry stubble, or use of supplementary grain adds variety and increases gains. For best results pasturing should follow harvesting by a week or 10 days, and the area limited by fencing so that

(Continued on next page)

BEET TOPS *(Continued from preceding page)*

it is cleaned up in 10 days to 2 weeks. Good utilization requires keen judgment; pasturing an area 1 day too long may cost many pounds of gain, and moving 1 day too soon may cost many feed days. Choking of both cattle and sheep is common in pasturing. Crowns remain soft in silage and this difficulty is obviated.

Fattening rations, in which beet-top silage is used to replace about one half of the hay normally fed or one fourth of the dry feed equivalent of the total ration, have produced gains and finish on cattle and sheep comparable to those of standard rations. The addition of 0.1 pound of calcium carbonate or ground oyster shell for cattle and 0.02 pound for sheep, costs little and may be beneficial. The usual daily allowance of beet-top silage is 20 to 30 pounds for cattle and 1.5 to 2 pounds for lambs.

SUGGESTED PROCEDURE

Many beet growers are not livestock men and most livestock men are not beet growers. This is the greatest obstacle in securing any immediate widespread utilization of tops. Progress will depend upon the extent that these two groups can get together on terms of mutual benefit and for the purpose of aiding the war effort.

To give some working basis for contract relationships that should be mutually advantageous to growers and feeders, adjustment to the local value of alfalfa hay and to the pasture value of tops is suggested. For example, a price for tops of 50 cents per ton of harvested beets would yield the grower having a 15-ton beet yield, $7.50 per acre. This is 50 per cent more than the common price of 30 to 35 cents per ton of beets, or $5.00 per acre for field pasturing. Using 3 tons of recovered silage per acre as a base and adding $2.00 per ton for trucking and stacking give a net cost to the feeder of $4.50 per ton; this allows a margin, for his protection, between cost and the $7.00 per ton feed-replacement value—if the farm price of alfalfa hay is $20 per ton. Adjustment in price may be made according to whether the tops are in windrows, piled at the end of fields, or delivered direct from topping machines to trucks.

Several possible use set-ups are suggested:

1. Stacking for convenient feeding at existing dairy, beef-cattle, or lamb-feeding plants in the vicinity.

2. Arrangement for conservation of beet tops and utilization by large feeding plants.

3. As an emergency measure, locating feeding grounds near centers of local beet production and bringing the livestock to the feed has great possibilities.

4. Several definite advantages to the grower of sugar beets where the tops are removed from the field are:

   (1) Permits early preparation of the land for future cropping.

   (2) Removal of tops to a central feeding point eliminates the necessity of pasturing and thereby prevents the spreading of weed seeds and plant disease by livestock in their movement over a field or from field to field.

   (3) Pasturing of tops is wasteful through trampling, sun drying and blowing.

   (4) Pasturing late in the season usually results in packing of soil.

For complete circular on this subject write to the Division of Animal Husbandry, College of Agriculture, Davis, California, or apply to your local Farm Advisor.

41

Beet top silage cut with a hay knife and fed from the end of a stack. This will prevent spoilage.
(Courtesy of Through the Leaves—Great Western Sugar Company)

"FEED BEET TOPS TO LIVE STOCK" IS USDA WAR BOARD APPEAL

The Monterey County USDA War Board, through Mr. Jan H. Martinus, chairman, has asked the Spreckels Sugar Company's cooperation in bringing about complete utilization of sugar beet tops for livestock feed. The feed situation makes it imperative that all cooperate in every way possible to conserve all available feed.

"Gentlemen:

We are asking for your cooperation in bringing about this year a complete utilization of sugar beet tops for livestock feed.

The Monterey County War Board and its Feed Committee have discussed this matter, and, in view of the fact that our ranges are now stocked to capacity and the supply of protein feed is either critically short or non-existent, we believe that this feed should not be wasted.

As you know, sugar beet tops have a high food value as stock feed, and the several thousand acres of beets which your firm has under contract in this county can well provide, in addition to the many tons of fine sugar and beet pulp, indirectly, thousands of pounds of meat.

We would appreciate it if you could, through your publications and by word of mouth through your field men, impress upon the growers that at this time the best usage that can be made of the beet tops is to feed them to livestock. If they have no stock of their own, they should sell the feed, and if they know of no buyers, to please contact this office in order that arrangements can be made to have it sold for feed.

(Signed) JAN H. MARTINUS,
Chairman USDA War Board."

COVER CROPS ARE IMPORTANT

IN THE SACRAMENTO DISTRICT

By H. J. VENNING, JR., *Agricultural Department*
Spreckels Sugar Company

Increasing and maintaining the humus or organic content of the soil is a most important part of a farm program. The addition of organic material to the soil can be accomplished by the use of animal manure, crop residues, or green manure cover crops. This discussion will deal only with cover crops, but the resultant soil conditions might be obtained to a greater or less degree by the use of any one of these three sources of organic material.

Continual cropping and working of the soil without the addition of humus reduces the amount of plant debris and likewise causes deterioration of the soil as to aeration, penetration, fertility, and general physical condition. The organic fraction serves as a medium for the growth of the micro-organisms of the soil and aids in rendering mineral plant food available to the crop.

The problem is to return to the soil by means of cover crops the greatest amount of plant material possible in a

manner that will fit in with the normal cropping rotation of the Sacramento-San Joaquin District. It is not desirable that the land be out of production for a whole season while a cover crop is planted and allowed to reach its ideal stage of growth. However, a green manure crop planted in October and turned under in April may be followed by a summer crop of beans or tomatoes, and any crop planted the following year. To plant a cover crop between two successive sugar beet crops is not considered practical under normal conditions.

The kind of crop to be selected will depend upon weather, and soil type and condition. Melilotus and the vetches will not germinate well in cold weather. Therefore, they should be planted on pre-irrigated land in October, while Fenugreek, which is more cold resistant, can be planted as late as December 15. Fenugreek, due to its root characteristics is recommended for heavy soils, while Hairy Vetch would be better on the lighter sandy soils.

The use of a legume crop, such as vetch, fenugreek, Melilotus, or Austrian winter peas, is preferred over cereals or mustard because of its nitrogen-producing ability. The non-legumes may cause a weed problem at times because the seed may be carried over to the succeeding crop, causing undesirable volunteer growth. The crop to use should be the one giving the greatest amount of growth for the particular area.

If the grower desires to obtain the greatest advantage of cover cropping, he should remember to make a proper seed bed, get a good stand, give the plant a chance to reach full growth, and allow time for decomposition after it is plowed under, before planting the succeeding crop.

IN THE SALINAS VALLEY DISTRICT

By RALPH S. LAMBDIN, *Assistant Agricultural Superintendent Spreckels Sugar Company*

Cropping programs are now being outlined for the 1944 season. Due to the demand for foodstuffs in time of war, the tendency may perhaps be toward reduction in the planting of cover crops; however, they are so very essential in the maintenance of soil fertility, they should be included in the crop program in order to secure maximum production over a series of years.

Previous reports published in this bulletin of the value of cover crops have shown increased yields in numerous crops such as beets, beans, tomatoes, and lettuce.

Cover crops should be planted early in the fall in order to secure maximum growth before the crop is plowed under in the spring. In most areas plantings should be made not later than Oct. 15, if possible.

Continued cover cropping over a period of years in areas where the soil is low in organic material has been followed by some outstanding results. In the Santa Rita district, north of Salinas, the soil is of a type that after being wet will become baked as it dries out, to a point where proper tilling and irrigation is difficult and aeration is also extremely poor.

Mr. W. M. Christensen, who farms in this district, has been planting approximately one half of his ranch to cover crops each year for the past seven years. This year a portion of the bean acreage planted on soil that was not in cover crop last season will be definitely lower in yield than the balance of the field. The continued cover cropping on this ranch has been a major factor in the good yields now being produced.

The popular varieties of cover crops are Purple Vetch, Melilotus indica, and fenugreek. In the Salinas District very good results have been obtained with a mixture of purple vetch and Melilotus. A sufficient supply of cover crop seed will be available for the coming season.

HARVESTING MACHINERY TO BE MAINTAINED

By AUSTIN ARMER, *Agricultural Engineer Spreckels Sugar Company*

The harvesting machinery program of the Spreckels Sugar Company involves the use of a large number of units, for the most part specially designed and constructed for this program. The subject of maintaining continuous, efficient operation is of paramount importance, and has been closely studied by the Agricultural Department.

Two central maintenance stations have been established, one at the Company Yard at Sacramento, the other at Spreckels. These stations are supplied with all tools and equipment needed for every service operation. Portable gasoline driven arc welders are available for major repairs of the equipment should accidents occur in the field. The yard crews have thoroughly familiarized themselves with all of the machines and are prepared for any emergency.

Supplies of spare parts are maintained at both stations and are available at all times.

Further, to insure continuous operation of the equipment, standard implement and automobile parts have been used wherever possible. These parts are stocked by implement and automobile dealers. Thus a supplementary supply of parts is made available in all farming centers.

This outline of service facilities, in spite of its importance to the harvesting machinery program, is secondary to the basic guarantee of uninterrupted mechanical harvest. This is the in-built field worthiness of each machine, a quality arrived at only as a result of choosing those units which have proved their stamina in the field.

SUGAR BEET SAMPLING AND ANALYSIS

By E. M. HARTMANN, *Chief Chemist, Spreckels Factory*

In order to determine accurately the basis for payment to the grower as well as to keep records of the amounts of sugar purchased, general condition of the beets, and performance of each contracted acreage, the Spreckels Sugar Co. employs the following general procedure:

Each load of beets delivered to a factory or to a railroad dump is first weighed, then cleaned on a mechanical screen. The dirt and trash removed by the screen is weighed and this weight is deducted from the gross weight of the load, giving the "first net" weight.

As each load of beets is discharged from the mechanical screen, a sample of about 20 lbs. is caught mechanically in a pan by passing it through the moving stream of beets. This sample with the loose dirt and trash caught in the pan is placed in a rubber lined bag. In the tare laboratory, the beets in the sample are dry-cleaned and the crowns are trimmed off according to a standard procedure. The difference in weight of the sample before and after cleaning and topping is called the "tare." This is calculated to a percentage of the original weight of the sample. Percent sugar is then determined on the cleaned and topped roots in the sample.

The first net weights, percent tares, and percent sugars are accumulated for each contract, and at the end of each month, the average percent tare and percent sugar in the beets delivered under each contract is determined. Tare, based on average tare percent is then deducted from the total first net weight of beets delivered under the corresponding contract during the month, giving the "final net" or "clean" weight of the beets delivered. This figure, together with the average percent sugar for the contract during the month, forms the basis for payment to the grower.

(Continued on next page)

SAMPLING *(Continued from preceding page)*

Every effort is made to keep the sampling and analysis on an accurate and impartial basis. Every individual load of beets is mechanically sampled. The samples are stored and transported to the tare laboratories in moisture-proof bags to prevent evaporation; and analyzed the same day the beets are delivered, to prevent deterioration. At the Woodland laboratory, where the high regional temperatures could cause instrument errors and evaporation of the samples during analysis, air conditioning is used to prevent the possibility of errors from these sources.

There is no possibility for partiality in the analytical results because the identifying ticket which accompanies each beet sample is sealed in an envelope, and the analytical results are entered on it by means of a perforator. Thus the analysts never know whose beets are being tested.

The procedure at each laboratory is frequently inspected and checked by a chemist employed by the California Beet Growers Association.

PURITY DETERMINATIONS

In addition to the tare and sugar determinations, the tare laboratory also runs purity determinations on beet samples taken at random from each day's receipts. Although the purity does not influence the grower's payment for the beets, it is nevertheless of considerable importance to the processor. The beet processor makes the final recovery of sugar by crystallizing the sugar out of a syrup. All sugar beets contain certain substances which prevent the crystallization of some of the sugar; therefore, a portion of the sugar must be recovered by a chemical treatment called "Steffenizing." This treatment involves additional expense and additional sugar losses. Low-purity beets contain more of these crystallization-hindering substances than do high-purity beets. Therefore, low-purity beets require the processor to Steffenize a larger portion of the sugar he buys in the beets, which results in higher costs and greater processing losses.

REASON FOR CROWN TARE

It can, therefore, be seen why the crown trimmings are included in the tare that is deducted from the weight of the grower's beets. The outer portion of the crown which is trimmed off in taring, besides containing a low percentage of sugar, is of such low purity that the sugar in it cannot be recovered economically. The following table illustrates this difference in sugar and purities:

1942 SEASON AVERAGES FOR DISTRICT I

	Percent Sugar	*Percent Purity*
Final net beets delivered - - -	17.64	85.29
Crown Tare (Crown trimmings included in deductible tare) -	12.58	71.43

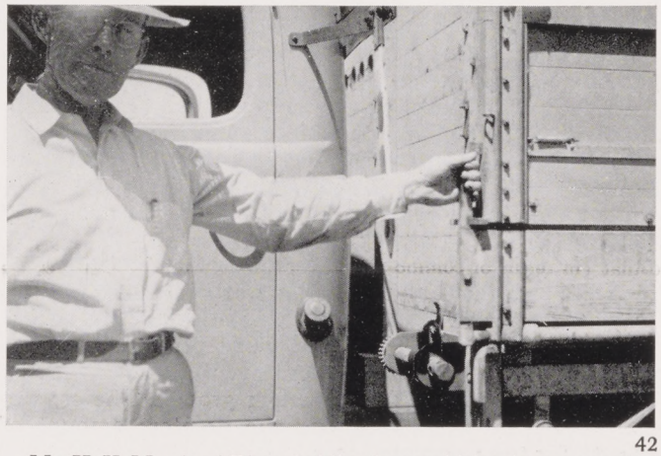
REASON FOR DIRT AND TRASH TARE

The dirt and trash tare is, of course, deducted primarily because these materials are of no use to the processor since they contain no sugar. Actually, they are worse than useless—they cause the processor additional expense and sugar losses. Pockets of trash in beets being transported by rail, or in beets in storage at the factory yard, decay rapidly with the production of heat. This heats up the neighboring beets, causing them to decompose with rapid loss of sugar. Excessive trash and dirt also interfere with the operation of the factory's beet-handling equipment, causing delays and extra work.

PRACTICAL BEET BED FOR TRUCKS

By GUY D. MANUEL, *Assistant Agricultural Superintendent Spreckels Sugar Company*

With the shortage of trucks to take care of beet harvest, growers may find it necessary to equip additional trucks for beet hauling. H. V. Morris at Dixon has designed a bed of simple construction requiring a minimum of critical material.



42

Mr. H. V. Morris of Dixon holding lever which releases apron of beet bed preparatory to dumping beets.

43

Side of beet bed, showing apron down and side door half open.

The front end and bed are permanent on the truck, and to complete the change over from the flat bed to beet bed requires less than half an hour. The tail gate is bolted on with angle iron supports and the side racks are hinged at the top, bolting into fixtures on each of the end gates. An 8-inch apron on each side of the bed is also permanent and this locks the side rack in place, as well as facilitating dumping.

When the beds are ready to dump there is a lever near the driver's cab that releases the lock on the apron which allows it to drop, leaving the door free to swing out. This saves considerable time at the beet dump, and in locking the door again there is no heavy lifting or chains to clamp into place.

The bed is hinged on both sides by means of pipes running through the cross beams and through a locking device which allows the bed to dump on either side.

Any growers interested in obtaining detailed plans of the bed may do so by contacting their fieldman.

REAL PRICE OF SUGAR IN TERMS OF COMMODITIES

Everyone is familiar with the fact that the cost of living varies from time to time, or that a dollar will purchase more at one time than it will at another.

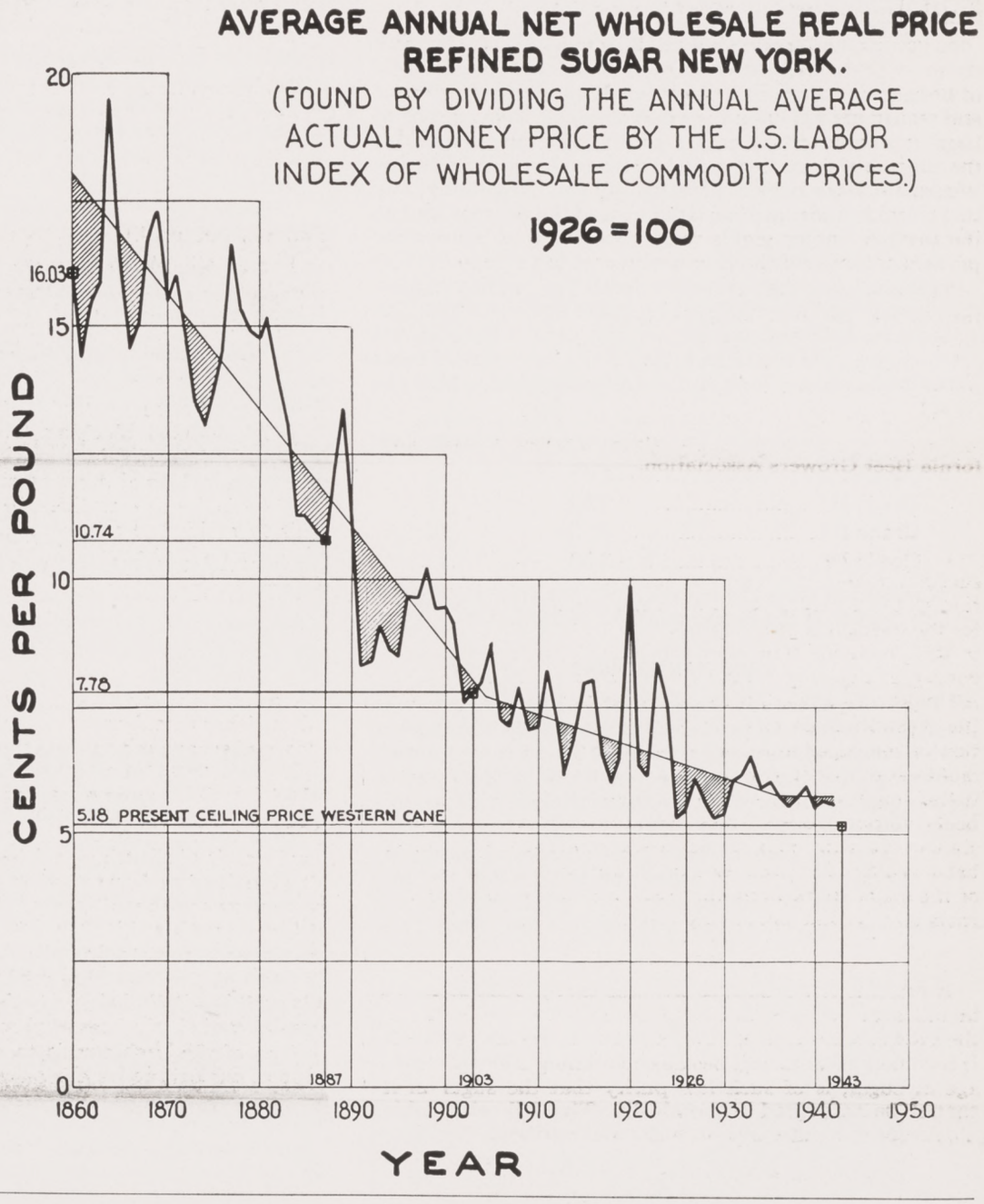
To the average American citizen the value of a dollar at any particular time is determined by the amount of commodities that may be purchased with that dollar.

Strenuous efforts are now being used to roll back prices so that (in terms of commodities which a dollar will purchase) the dollar will have the same value as it had in 1926.

This chart shows the average yearly net wholesale price of refined sugar at New York since 1860 if the average value of the dollar each year is adjusted to equal the value of a dollar during the year 1926.

The trend of these real prices (in terms of the 1926 dollar) throughout this period is indicated by the straight lines and shows the steady reduction in the cost of sugar to the American public.

A dollar will purchase three times as much sugar today as in 1860; twice as much as in 1887; and one and one-half times as much as in 1903 — in fact, more sugar can be purchased today with a dollar in the West than in any year in United States history.



SOIL SELECTION AND MANAGEMENT AFFECT SUGAR BEET COSTS

By W. B. MARCUM, *Agricultural Department Spreckels Sugar Company*

The net return from a crop of sugar beets depends upon the cost of production, yield and quality of beets, and the price received. Greater net returns can be obtained by adopting crop and soil management practices that tend to increase yields. Increased net returns can also be secured by using labor and equipment efficiently to reduce the cost of performing the various operations necessary for the production of sugar beets.

PRODUCTION COSTS

In 1941, a study of sugar beet costs in relation to management was made in Nebraska by the Agricultural Experiment Station[1]. The average cost of producing beets, based upon 286 records from 266 farmers, was $71.89 per acre or $5.45 per ton, not including land rental.

The cost data presented in the Nebraska study are based upon sugar beet production under growing conditions in one area during one year. The conditions presented for Nebraska, of course, vary materially from those found in California and it is recognized that quoting here the costs of producing beets in Nebraska has little or no application to the production costs in California. However, the figures are being used because they so clearly illustrate the value of good management and are of revealing interest.

QUALITY OF LAND

A satisfactory analysis of the cost of producing beets cannot be made by averaging the records of all farmers as

(Continued on next page)

SOIL SELECTION *(Continued from preceding page)*

one group. Averages do not tell how much it costs farmers to grow beets on good land or on poor land, or with good management or poor management. However, the influence of quality of land upon the yield obtained from an acre of land in relation to the cost of producing a ton of beets can readily be shown. In the Nebraska study each farm was classified on the basis of productivity and topography. The best land is designated as Grade I, and the poorest land as Grade IV. Larger yields were obtained from the better grades of land and the production cost per acre to harvest was slightly less than on poorer land. The larger yields on the better land are reflected by lower costs per ton. The tabulation below shows the average cost to harvest, *not including a land use charge,* for producing a ton of beets from each grade of land and the average yield in tons per acre:

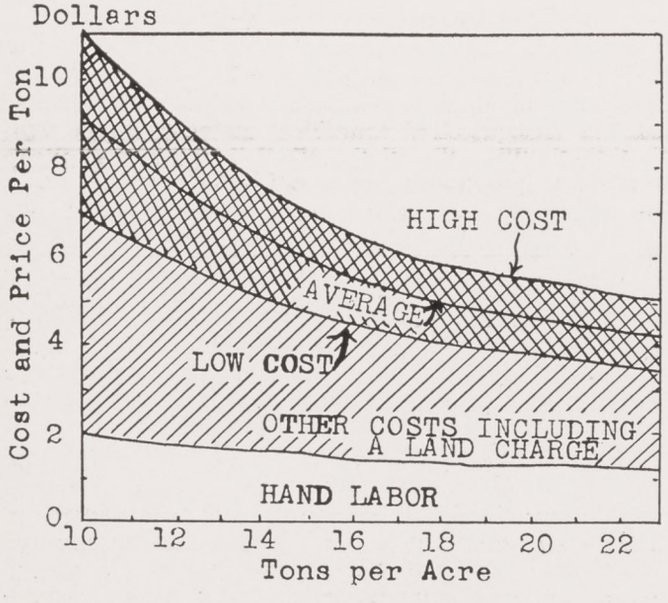
	Costs per ton	Tons per acre
Grade I	$2.48	19
Grade II	2.82	17
Grade III	3.15	16
Grade IV	3.53	14

Needless to state the net earnings per acre are considerably higher in the better qualities of land.

CROP MANAGEMENT

The Nebraska study showed that, in 1941, growers, who kept their costs low, produced as many tons of beets per acre as those whose costs were high. These same growers showed an additional profit of from $1.50 to $4.00 per ton as compensation for their managerial ability, depending upon tons of beets produced.

The average cost, *without land charge,* of producing and harvesting a ton of beets was $4.26 when the best land was used in combination with good soil and crop management practices and with efficient use of labor and other resources, and $9.81 under an unfavorable combination of poor soil and management.



Relationship of yields to the cost of producing a ton of beets in 1941, on acreage included in a study by the College of Agriculture, Univ. of Nebraska. The cross hatched portion of the chart, above and below the line representing the average, shows the variation in the cost of producing a ton of beets.

In order to produce economically a sufficient supply of sugar for our wartime needs, methods must be considered to reduce costs without endangering yields. Efficient production and utilization of recent technical improvements will accomplish this end. The following points are presented for consideration:

1. Select good land. Land should be fertile, well drained, and level.

2. Use resources efficiently. The input of labor, materials and equipment should be utilized to produce the best crop at the lowest cost.

3. Sheared seed. Proper planting of sheared seed will produce 50 percent less doubles and require at least 50 percent less labor during thinning.

4. Mechanical blocking. The use of the Dixie Beet Thinner on plantings made with sheared seed will materially lower costs of thinning and hoeing.

5. Mechanical harvesting. The use of mechanical topping and cross-conveyor loading machines aids in reducing hand labor as much as one-third of that normally necessary.

Reference: (1) Sugar Beet Costs and Management in Irrigated Sections of Western Nebraska (Bul. 341) Agr. Exp. Sta., College of Agr., Univ. of Neb.

THE APPLICATION OF NITROGEN IN IRRIGATION WATER

By J. C. JOHNSTON, *Extension Specialist in Citriculture*[1]

The application of chemical nitrogen in irrigation water is of special interest at this time because many growers will receive their fertilizer later than usual or it may be delivered in several installments. In many cases, this will necessitate changes in the method of using fertilizer if the greatest good is to be gotten from the materials available.

One of the problems is to get nitrogen into the root area of the soil when it is applied after the rainy season has closed. When soil is sprinkled or flooded, water penetrates downward more or less uniformly over all of the area wetted and fertilizer broadcast on the soil or dissolved in irrigation water penetrates satisfactorily, subject to limitations cited in later paragraphs.

When water is applied in furrows, part of the water penetrates downward and part moves sideways from the furrow and tends to carry soluble materials which are in or on the soil surface away from the furrow and toward the soil surface. On the other hand materials applied in the furrows before irrigation or dissolved in the irrigation water tend to move with the water into the root zone and give good distribution of the nitrogen. It is the purpose of this discussion to suggest methods of dissolving and applying nitrogen in irrigation water.

This method of applying soluble fertilizers and the mechanical devices used in the process are covered by a basic patent No. 1,868,913 owned by Eugene L. Prizer, J. Prizer, Donald C. Jones, and H. G. Nutt. These gentlemen have generously waived their rights for the duration of the war. Materials are not available to make new applicators and they feel that growers should have the privilege

of using the method without restriction during the war period.

The common chemical nitrogen fertilizers available at this time are nitrate of soda, sulfate of ammonia, liquid ammonia, and ammonium nitrate. These materials behave differently when applied to the soil in irrigation water, but they all can be used successfully.

Nitrogen in the nitrate form penetrates soil readily and is carried into the soil as far as the water in which it is dissolved penetrates. Nitrate of soda is therefore a desirable form of nitrogen to use in irrigation water and is especially desirable where quick penetration is desired.

Nitrogen in the ammonia form becomes insoluble on contact with soil and remains fixed in the surface until it is transformed into the soluble nitrate form by soil organisms. When it is applied in irrigation water, it becomes fixed in the soil in the furrow and does not penetrate far below the surface. There is also a tendency for more nitrogen to be fixed in the upper end of the furrow than in the lower end. This tendency is greater in heavy clay soil than in light sandy soil, and it is greater when the stream carries soil particles than when the water runs clear. Because of this characteristic, furrows longer than 300 feet should be avoided whenever possible when any form of ammonia is used. In the interval between irrigations, the nitrogen which has been fixed by the soil is made soluble by the action of soil organisms and is carried into the root area by subsequent irrigations. For best results, it is necessary to use the same furrows one or more times after the fertilizer has been applied.

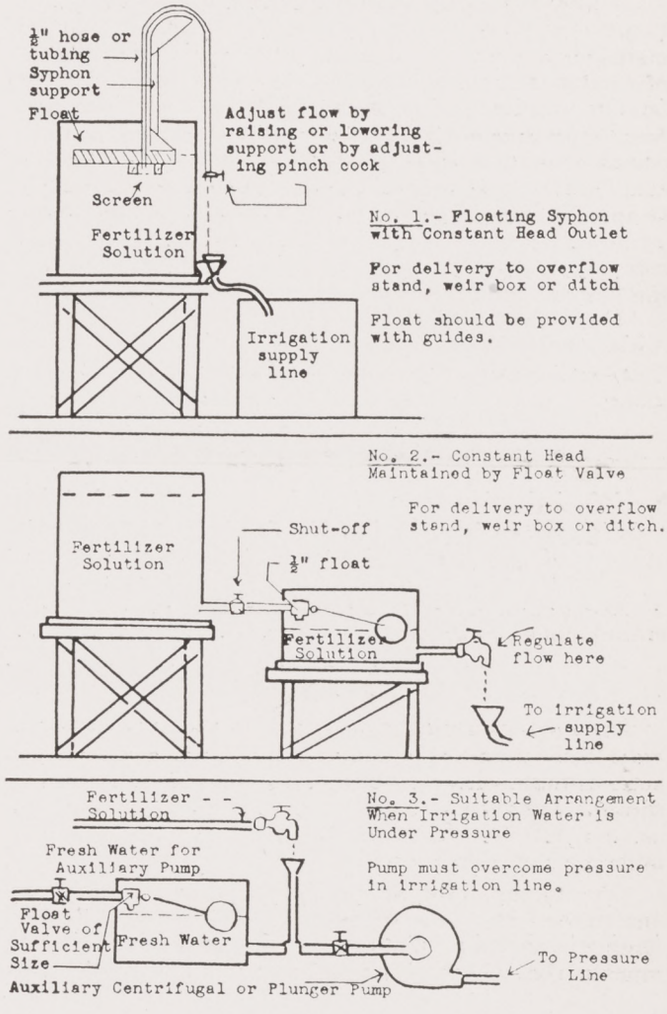
Ammonium sulfate and liquid ammonia give good results when applied in irrigation water. The slower penetration which results from the use of this form of nitrogen is often desirable especially with shallow rooted crops and on open sandy soils where the fertilizer is apt to be carried below the root zone before it can be utilized by plants.

Liquid ammonia is a gas which has been reduced to the liquid form by pressure and is sold in steel cylinders. It dissolves very rapidly in water and is well suited to use in irrigation water. However, it is a gas and there is a certain amount of loss to the air during the time the solution is exposed in the irrigation furrows.

The rate of loss is determined by a number of factors and it is not possible to say how great it may be. The rate of loss increases as the air and water become warmer. The loss is greater in the sunshine than in the shade and is greater from a turbulent stream than from a smooth flowing stream. It is increased by wind, and by the length of time it is exposed to the air before it gets into the soil. Even the amount and kind of minerals dissolved in the water influence the rate of loss. For best results, it should be applied in short runs and in smooth furrows. Weather cannot be selected but a cool, still day would be best and the loss at night would be less than in daytime.

Ammonium nitrate contains half of its nitrogen in the ammonia form and half in the nitrate form. Therefore, when this material is used in irrigation water, half of the nitrogen is carried into the soil by the water and half becomes fixed in the furrow to be changed to the nitrate form and later to be carried down by subsequent irrigations. This material would appear to have an advantage where both a quick and sustained effect are desired.

METHODS OF INTRODUCING DISSOLVED FERTILIZERS INTO IRRIGATION WATER



METHODS OF DISSOLVING CHEMICAL NITROGEN

There are several simple and practical methods of dissolving chemical nitrogen in irrigation water. Where an open ditch or flume is available a paddle wheel device can be constructed of noncritical materials which will feed the fertilizer directly into the irrigation stream. Such a device is described by C. S. Scofield in United States Department of Agriculture Circular 28, September, 1928.

The most simple method of dissolving fertilizers in irrigation water is to slit the bags and throw them into a weir box or other similar structure. By regulating the number of bags exposed to the irrigation stream and the size and number of slits in the bags, the rate of application can be controlled within certain limits. At best, this method will result in a considerable fluctuation in the amount of fertilizer carried by the water.

In some instances the irrigation layout is not suited to this method and in many cases, more accurate control is to be desired. A more accurate method is to dissolve a definite amount of fertilizer in a tank of known capacity. The solution can then be trickled into the irrigation stream and by regulating the rate of flow any desired amount of fertilizer can be applied.

If the solution is drawn off through a valve in the bottom of the tank, the rate of flow will decrease as the tank empties but with a little attention from the irrigator a

(Continued on next page)

fairly uniform flow can be maintained. In certain cases, some means of maintaining a more uniform flow is necessary. One easy way to accomplish this is to provide a floating outlet illustrated in diagram No. 1. It consists of a syphon which is held in place by a floating support placed in the tank. One end of the hose extends 2 or 3 inches below the surface of the solution and is protected by a suitable screen. The stream can be regulated by raising or lowering the outlet, or by a clamp which reduces the flow by pinching the hose. The hose should be only slightly larger than necessary to carry the desired stream. This method has the advantage of uniform flow and the outlet is away from any trash which may float on the surface or which may accumulate on the bottom of the tank.

Another method is to draw the solution off through a small tank in which a constant level is maintained by means of a horse trough float valve as shown in diagram No. 2.

If the irrigation system is under pressure, the fertilizer solution can be pumped into the line by a small centrifugal or gear pump operated by a ¼ h.p. motor. A good arrangement is to have a small tank supplied with water from the irrigation line and with a float valve to regulate the water level. The fertilizer solution is then run into this tank or preferably the pipe leading from it and pumped into the irrigation line. The latter arrangement keeps fertilizer away from the float valve and avoids corrosion. This arrangement is shown in diagram No. 3. In all cases the fertilizer should be introduced into the irrigation line well ahead of the first outlet so as to make sure thorough mixing takes place.

The distribution of fertilizers in solution can be no better than the distribution of the irrigation water in which it is dissolved and great care must be used to see that all parts of the field receive equal amounts of water if waste is to be avoided. Where sprinklers are used or where water is applied in basins, this is not difficult, but with furrow irrigation, there is a tendency to allow excessive penetration at the upper end of the run or to allow run-off at the lower end of the run. Penetration can be equalized by using short runs and by hurrying the water through to the end of the furrow and then regulating the stream to avoid run-off. Some growers hold the fertilizers off until water is through to the end of the furrows, or they apply the fertilizer only during the latter part of the run. When nitrate nitrogen is used on open, sandy soil it may be desirable to apply the fertilizer only in the last part of the run to avoid excessive penetration, but this is only desirable where loss by deep penetration occurs and on soils where a reduction in percolation rate would not be objectionable. In general, the fertilizer should be put in all of the water so as to keep the concentration as low as possible.

Some fertilizers when dissolved in irrigation water tend to decrease the rate of water penetration on some soils. This effect is minimized by keeping the solution as dilute as possible; in other words, by distributing it through all of the water. In some instances the rate of water absorption by the furrows may be greatly reduced. In such cases, it is helpful to break the crust in the furrows by suitable tillage.

Fertilizers used in irrigation water have been known to cause failure of concrete pipe lines. This effect has been studied by Professor A. F. Pillsbury of the University of California at Los Angeles. He reports as follows:

Ammonium sulfate has the most harmful effects on concrete. The corrosive effect appears to be in proportion to the concentration of the solutions, and the period of exposure. Ammonium sulfate can be used without undue hazard in irrigation water if the following rules are observed: (a) a proportioning device must be used to prevent solutions from ever being more concentrated than about 0.2 per cent; (b) concrete pipe lines must be flushed with "clean" water after each application; and (c) as is customary, the total net time the solutions are in contact with pipe lines may not exceed about one week per year. Nitrate of soda, liquid ammonia, and ammonium nitrate in concentrations comparable to those used when fertilizer is applied in irrigation water had no more effect on the pipe than distilled water.

If the fertilizer is to be dissolved in a tank, it will assist in determining the size of the tank needed if the solubility of the materials to be used is known. In round numbers the amount which will dissolve in 100 gallons of water at ordinary temperatures is as follows:

Nitrate of soda	700 lbs. per 100 gals. of water
Ammonium sulfate	600 lbs. per 100 gals. of water
Ammonium nitrate	1400 lbs. per 100 gals. of water

It is not easy to get the maximum amount of fertilizer indicated into solution so a lesser amount should be used, say 500 lbs. of fertilizer to 100 gallons of water. It will be more accurate if the fertilizer is dissolved before the tank is filled to the desired capacity.

A common method used to dissolve fertilizers for this purpose is to suspend the material in the tank in burlap bags. Whatever method is used, be sure the fertilizer is all dissolved and the solution is thoroughly stirred before application begins.

An example will serve to show how the method works. If it takes 24 hours to irrigate a 10-acre field, and the owner wants to apply 100 lbs. of fertilizer per acre, 1000 lbs. of fertilizer will be required. If the fertilizer is dissolved in 200 gallons of water, it will take 8 1/3 gallons of solution per hour to supply the right amount of nitrogen if it is used in the entire run. At this rate the stream will fill a gallon measure in 7 minutes and 12 seconds. If this is too slow for the apparatus, the amount of water used to dissolve the fertilizer can be increased. If 400 gallons are used to dissolve the fertilizer it will be necessary to adjust the stream to fill a gallon measure in 3 minutes and 36 seconds.

When soluble nitrogen fertilizer is to be applied during the irrigation season, it is economical and practical to dissolve it in the irrigation water wherever the irrigation layout is such that the distribution of water can be controlled. If the water cannot be distributed evenly, the method will be wasteful and some other system of distribution should be used.

1. Cooperative Extension Work in Agriculture and Home Economics, State of California, University of California and United States Department of Agriculture.

Spreckels SUGAR BEET Bulletin

PUBLISHED FOR CALIFORNIA SUGAR BEET GROWERS BY THE SPRECKELS SUGAR COMPANY

Vol. VII OCTOBER 1943 No. 10

THE BEET SUGAR PROBLEM GOES ON THE AIR

By RONALD B. HAYES, *Merchandising Manager*
Spreckels Sugar Company

On September 4, in a half hour program, the Columbia Broadcasting System's Pacific Coast network presented the sugar-beet farmer's plight to western listeners.

CBS World News' staff of researchers and reporters, together with a ton of broadcasting equipment, traveled from Hollywood to the Spreckels Factory at Spreckels, California, to tell the beet sugar story under the direction of Fox Case, CBS' director of special events.

With Fox Case were three of Columbia's best known commentators, and news analysts—Dr. Wallace Sterling, Nelson Pringle and Chet Huntley.

Dr. Wallace Sterling, faculty member at the California Institute of Technology and radio news analyst, interviewed three sugar beet farmers and obtained from them the problems with which they are faced regarding their 1944 plans.

Mr. Oliver Barden and Mr. Harold Gunnel explained in the interview that there is at present a ceiling price on sugar only 17½% higher than the average price for the period of 1931 through 1940 and that the present prices on most other foods are many times higher—a fact that makes other crops more profitable to grow. Both of these Salinas Valley sugar beet growers emphasized that the Government program for this season was announced so late that many growers refused to take a chance and that the 1944 beet sugar program must be announced by October 1 of this year.

REHEARSING FOR THE BROADCAST

44

From left to right, the personnel is Harold Gunnel, beet grower; Leo Marihart, President of the Salinas Branch of the Central California Beet Growers Association; Oliver Bardin, beet grower; Wm. Paulsen, Agricultural Superintendent of Spreckels Sugar Company (in background); Dr. Wallace Sterling, faculty member at the California Institute of Technology and radio news analyst; Chas. L. Pioda, Resident Manager of the Spreckels Sugar Company, and Juan, a Mexican National.

BROADCASTING FROM FACTORY BEET BIN NO. 1

45

Nelson Pringle of CBS, holds the beets while Chet Huntley holds the microphone.

Dr. Sterling also interviewed Mr. Leo Marihart, president of the Salinas Valley Beet Growers Association. Mr. Marihart stated that Gordon Lyons, Secretary-Manager of the California Beet Growers Association, was in Washington asking the various Government agencies to get together and announce the 1944 sugar beet program by October 1 of this year. He explained the matter especially concerned California beet growers since the planting season begins here in September. Marihart also informed listeners that the California beet acreage was 100,000 acres below normal and 134,000 acres below the Department of Agriculture's goal for the state this year. Dr. Sterling asked Mr. Marihart what this meant in sugar lost and Mr. Marihart stated that it represented a loss of 500,000,000 pounds of sugar.

The half hour program started with a dramatized prologue produced at Hollywood with a cast of network radio players. In the prologue, CBS World News told the use of sugar in a working, fighting nation, on the home front and overseas.

After the prologue in Hollywood, controls were switched by CBS to Spreckels.

Dr. Sterling, speaking from the office of the Spreckels Factory, traced the history of sugar beets and the influence of sugar on previous wars. He explained the place of sugar in ethyl alcohol in the current conflict and in war industries and brought out the formula of the sugar beet

(Continued on next page)

SUGAR PROBLEM ON AIR *(Continued from preceding page)*

transformed into food energy, beef, bullets and war supplies.

From numerous points in the factory Chet Huntley gave a dramatic description of the processing of sugar from sugar beets.

Nelson Pringle most effectively interviewed two women workers. He particularly emphasized women's part in the war effort.

After Dr. Sterling interviewed the sugar beet growers, he introduced Mr. Charles Pioda, Resident Manager at Spreckels, who summed up the beet sugar industry's complaint as follows:

"Dr. Sterling, I want to emphasize what you said a moment ago, that our complaint, as you call it, is a vigorous but understanding protest against circumstances. This is war and it would be a peculiar war that does not bring dislocation and confusion somewhere. On the other hand, government agencies know and we know that sugar must not only be produced for the prosecution of the war, but we believe, too, that it can help to alleviate hunger and suffering after the war in the form of quick energy foods for those unfortunate people in war torn countries. Therefore, it would be well to have reserve stocks of sugar. The beet grower of the nation and the sugar refiner are both patriotic and sincere. They know the value of their product. They ask only that attention be given the circumstances which are now making the growing of the sugar beet extremely difficult and unattractive."

After Mr. Pioda's comments, controls were switched back to Hollywood. Bob Andersen, famed radio news commentator, ended the half hour program by stating:

"And there you have the report of CBS World News on the problem of the sugar beet. The Department of Agriculture asked this year that beet plantings be increased, since the beet contributes to the energy of the nation, to industrial products, to extra beef, and to bullets. The farmer, on the other hand, is asking that sugar prices be brought into line with other foods or that other food prices be brought into line with sugar, that some assurances of a labor supply be given, that farm machinery be made available, and that the program for sugar beets be announced by October 1st."

SPRECKELS MAKES FACTORY LIME AVAILABLE TO BEET GROWERS

Waste factory lime has been found to be excellent in improving the physical condition of the soil. For some years now sugar beet growers have been availing themselves of the opportunity to obtain this lime from the Company's factories to apply on their sugar beet land.

Possibly some of the growers producing beets for the Spreckels Sugar Company may not be acquainted with the fact that this lime is available to them and for this reason we wish to point out that growers may obtain lime for application to sugar beet fields by contacting their field superintendents. The lime may be secured from the Spreckels Sugar Company's factories at Manteca, Spreckels, or Woodland.

COMMODITY CREDIT CORPORATION MAKES PRELIMINARY REPORT CONCERNING 1944 SUGAR BEET PROGRAM

To: Mr. Neil Kelly, Secretary
U. S. Beet Sugar Assn., Washington, D. C.

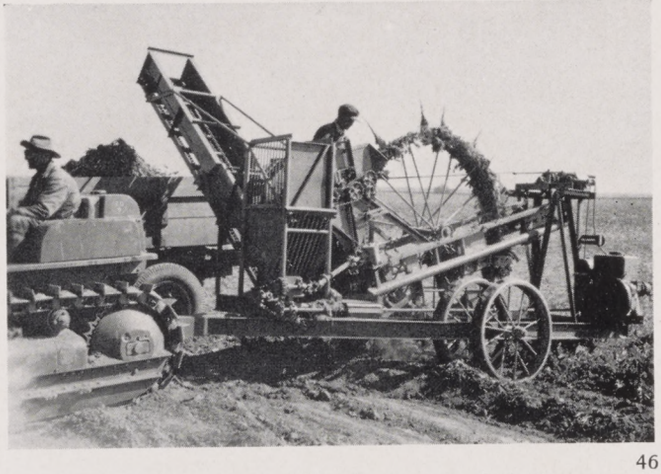
"After our meeting of yesterday, I discussed with Mr. Hutson the matter of policy involved in the 1944 beet sugar program. It is the desire of the War Food Administration to increase the 1944 crop substantially over the expected 1943 outturn. I mentioned to Mr. Hutson the concern expressed by members of the industry regarding the relationship of the beet program to the support programs in effect for competitive crops. This problem will be carefully weighed along with similar problems for other crops, but it is our desire to announce a decision for all these questions at the same time."

(Signed) EARL WILSON
Sugar Section Commodity Credit Corporation

MARION BEET HARVESTER IN OPERATION

Photographs by AUSTIN ARMER, *Agricultural Engineer Spreckels Sugar Company*

These photographs illustrate the performance of the Marion Wheel beet harvester. This machine requires only one operator, and is drawn by a small crawler tractor.



46

Fig. 1 shows the harvester just finishing a row of beets.

47

Fig. 2 shows the beets impaled on the spiked wheel, about to enter the topping knives at the upper right.

(Continued on page 48)

CALIFORNIA AGRICULTURE AND INDUSTRY WORK TO AID SUGAR PROGRAM

By J. E. COKE, *General Agriculturist*
Spreckels Sugar Company

The support given the sugar beet industry by allied agricultural and commercial groups in its attempt to secure a satisfactory 1944 sugar beet program has been most gratifying.

Because of the interest and active support which the numerous organizations and interests in California, not directly connected with sugar beet production, have manifested in the sugar program, the California Committee National Sugar Program has been set up.

Serving as committee members in this group are many of the outstanding leaders in California agriculture, business, and other groups. A large number of these organizations have contacted their California Congressmen personally or by correspondence, or both, pointing out the importance of the sugar industry and the necessity for an immediate and satisfactory program on the part of the federal government.

The California Committee National Sugar Program is composed of the following members:

This list is not complete as daily many representatives of influential groups are becoming acquainted with the sugar program and are adding their endorsement by becoming members of the above committee.

CALIFORNIA COMMITTEE NATIONAL SUGAR PROGRAM

GORDON LYONS, *Chairman*

VICE-CHAIRMEN

LOREN C. BAMERT
Ione
President, California Cattlemen's Association

HUGO CALLENBERG
President, Bureau of Hotels, Restaurants and Purveyors
President, San Francisco Restaurant Association

R. C. CARPENTER
President, Western Confectioner's Association

E. STANTON DALEY
Woodland
President, Associated Farmers of Calif.

FRED A. ELLENWOOD
Red Bluff
Honorary President, National Wool Growers Association

ADRIAN FALK
Chairman, Agricultural Committee, S. F. Chamber of Commerce

LESTER HOLMES
President, Calif. Field Crops, Inc.

ARTHUR KIRWAN
President, California Retail Grocers and Merchants Association, Ltd.

A. J. McFADDEN
Chairman, State-Wide Agricultural Committee, California State Chamber of Commerce

OTTO ROHWER
President, Sacramento Chamber of Commerce

J. L. SAWYER
Oakdale
President, California Wool Growers

GEORGE H. SEHLMEYER
Master, California State Grange

E. W. STEPHENS
Pres. and Gen. Mgr., So. S. F. Union Stockyards and Pres., So. S. F. Mfrs. Assoc.

RALPH H. TAYLOR
Sec., Agricultural Council of Calif.

CLIFFORD TOTMAN
President, California Beet Growers Association, Ltd.

RAY WISER
President, California Farm Bureau Federation

ALDEN ANDERSON
President, Capitol National Bank, Sacramento

DR. MARIANA BERTOLA
San Francisco

DR. GUY BOGART
Exec. Secy., Beaumont Chamber of Commerce

HAROLD J. BOYD
Chairman, Regional Serv. Committee, City and County of San Francisco

GUS BRODERSEN
President, Gilroy Chamber of Commerce

A. L. BROWN
President, Hollister Chamber of Commerce

W. G. BUCHANAN
Pres., Pittsburg Chamber of Commerce

HARRY A. CADDOW
Secretary-Treasurer, Wine Institute, San Francisco

EARL G. CALLENDER
Pres., Pajaro Valley Chamber of Commerce, Watsonville, Calif.

G. C. CARTER
Chico
President, Glenn-Butte Wool Growers Association
Director, Calif. Wool Growers Assn.

ELVIN I. DOWNS
Pres., Corona Chamber of Commerce

MARSHALL DRAGOMANOVICH
Pres., San Andreas Progressive Club

L. J. DURFY
Pres., West Metropolitan Chamber of Commerce, Hollywood, Calif.

IRWIN FARRAR
Farrar-Loomis Seed Co., Hemet

PAUL E. FORGEY
Pres., Santa Cruz Chamber of Commerce

RALPH GABELMAN
President, East Bay Retail Bakers Association

ROY E. GAMMILL
Pres., Santa Barbara Chamber of Commerce

A. J. GAULT
Pres., Oroville Chamber of Commerce

DR. F. B. GODBOLT
Pres., Red Bluff Chamber of Commerce

C. RALPH GORDON
Pres., Klamath River Chamber of Commerce

SAM GREENE
Secretary California Dairy Council

MRS. PRENTISS COBB HALE
San Francisco

C. F. HATCH
Pres., Vallejo Chamber of Commerce

WM. K. HENDRIX
Pres., Chico Chamber of Commerce

V. B. HICKEY
Pres., Davis Chamber of Commerce

SIG F. HOBLER
Pres., Fresno County Cattlemen's Association

A. B. HUGHES
President, Retail Bakers Council of Northern California

ERNEST W. HULL
President, Woodland Chamber of Commerce

ERNEST INGOLD
President, San Francisco Chamber of Commerce

GEORGE JACOBS
Pres., Eureka Chamber of Commerce

ARTHUR W. JOHNSON
Pres., Reedley Chamber of Commerce

O. J. LACY
President, California Western States Life Insurance Co.

DEAN S. LESHER
Pres., Merced City Chamber of Commerce

C. A. McCARTNEY
Pres., Martinez Chamber of Commerce

MRS. HULDA McGINN
Exec. Secy. and Mgr., California Theatre Assoc., San Francisco

MRS. CLARENCE W. MORRIS
Pres., Safety League Northern Calif.
Pres., Landmarks Council, San Francisco

DUDLEY J. MORRISON
Pres., Santa Ana Chamber of Commerce

GENE MORRISON
Pres., Sutter Co. Chamber of Commerce

O. A. MOXNESS
Pres., San Dieguito Dist. Chamber of Commerce

H. C. NEUFELD
Pres., Shafter Business Men's Assoc.

HARRY NYSTROM
Pres., Turlock Chamber of Commerce

WALTER L. PAINE
President, King City Chamber of Commerce

JOHN PICKETT
Editor, Pacific Rural Press, San Francisco

CHAS. L. PIODA
President, Salinas Chamber of Commerce

L. A. ROBERTSON
Pres., Humboldt Wool Growers

HARRIS G. SHERMAN
Pres., Twentynine Palms Chamber of Commerce

WARREN N. SHINGLE
Pres., Marysville Dist. Chamber of Commerce

LOUIS SILVERA
Pres., Antioch Chamber of Commerce

MRS. T. M. SIMMS
State Chairman, Farm Home Dept. Fresno, Calif.

JUNIUS SMART
Oakdale
President, Central California Wool Growers Association
Director, California Wool Growers Association

EDWIN F. SMITH
Pres., El Dorado County Chamber of Commerce

H. R. SUMPF
Pres., Coalinga Chamber of Commerce

ROYAL WALTZ
Pres., Cambria Chamber of Commerce

R. C. WILSON
Secretary, Statewide Agricultural Committee, California State Chamber of Commerce

ALLEN WITTER
Pres., Brawley Chamber of Commerce

ENDORSEMENTS OF SUGAR PROGRAM

Coalinga Chamber of Commerce
Tracy District Chamber of Commerce
Shafter Business Mens Association
Reedley Chamber of Commerce
Twentynine Palms Chamber of Commerce
Merced City Chamber of Commerce
Humboldt Wool Growers
Grass Valley Chamber of Commerce
California Farm Bureau Federation
California Wool Growers Association
California Cattlemen's Association
San Francisco Chamber of Commerce
California State Chamber of Commerce (Agricultural Committee)
Sacramento Chamber of Commerce
San Luis Obispo Chamber of Commerce
Turlock Chamber of Commerce
Oroville Chamber of Commerce
Davis Chamber of Commerce
Vallejo Chamber of Commerce
Pajaro Valley Chamber of Commerce
Antioch Chamber of Commerce
Corona Chamber of Commerce
Beaumont Chamber of Commerce
West Metropolitan Chamber of Commerce
Julian Chamber of Commerce
Santa Cruz Chamber of Commerce
El Dorado County Chamber of Commerce
Chico Chamber of Commerce
San Dieguito Dist. Chamber of Commerce
Red Bluff Chamber of Commerce
Figarden Farm Bureau
Fresno County Cattlemen's Association
Martinez Chamber of Commerce
San Andreas Progressive Club
Santa Ana Chamber of Commerce
Brawley Chamber of Commerce
San Pedro Chamber of Commerce
Santa Barbara Chamber of Commerce

MARION HARVESTER (Continued from page 46)

48

Fig. 3 shows the tops as they fall from the delivery chute.

49

Fig. 4 shows a load of clean, topped beets. This truck was loaded in 35 minutes of machine operation in a 15 ton per acre yield.

FALL LAND PREPARATION IMPORTANT

IN THE SACRAMENTO-SAN JOAQUIN VALLEY DISTRICT

By G. D. MANUEL, *Asst. Agricultural Superintendent*
Spreckels Sugar Company

Fall land preparation has always been important to a well planned farming program, and with the critical labor shortage, has become of even greater importance.

Having all possible work done in the fall allows the grower to take advantage of breaks in the winter weather for beet planting. If plowing is put off until it is necessary to wait for the land to dry sufficiently and then prepare the seed bed, another rain might prevent planting.

Aside from the time element there are other advantages that make fall preparation desirable. Aeration is greatly increased by working the ground dry and allowing it to lay open. Subsoiling and deep chiselling can only be done effectively in the fall and these operations have definitely proven their worth in crop production. Leveling can be accomplished more easily on dry ground, and heavily scraped areas aerated to some degree so that less effect is shown on the following crop.

Plowing under of stubble and trash is a very good preventative against any insect outbreak as eggs are more likely to be deposited in trashy fields. The earlier the fields are cleaned up, the less chance of attack from pests the next spring.

Even if there is some uncertainty as to crops to be planted for the coming season, growers should not permit this to delay their fall work. The land preparation for most crops will vary only slightly and even if there is a change in the cropping program the grower who has his work done is in a position to plant without further delay.

Land in barley and beans this past season is now ready to be worked. By starting the 1944 program now, it will not be necessary to crowd operations in the spring. Beets often suffer serious damage from late thinning, cultivation, and irrigation because other farm work must be done that could have been completed months before. A timely program will prevent such happenings and help in producing better crops.

IN THE SALINAS VALLEY DISTRICT

By W. B. MARCUM, *Field Superintendent*
Spreckels Sugar Company

Timeliness is an important factor of proper preparation of land for a seed bed. The early tilling of soil often spells the difference between success and failure of the subsequent crop.

Deep tillage, which is recognized as an important step in land preparation, is best done in the fall when the soil is not too wet rather than in the spring, except as may be necessary to prepare a proper seed bed for later planting.

The operations of land preparation which are timely in the fall, while the soil is comparatively dry, include deep plowing, subsoiling, levelling, and listing.

Deep tillage and listing at this time of the year permit soil aeration without the attendant wet working of and possible compaction of the soil occurring when these operations are performed in the spring. Also, the soil has better drainage during the rainy season, permitting early planting and a subsequent longer growing season. Ridges made in the fall provide a seed bed in which the clods are usually "mellowed," with the beds firmed down by the rain.

Although there may be a reluctance on the part of some growers to prepare ridges before the rainy season because of the occurrence of weed growth, proper cultivating equipment can, if advantage is taken of every break in the weather to work the land, eliminate this difficulty. Even though in certain cases it may be necessary to destroy the ridges previously made, the soil is in excellent condition for reforming beds.

In the so-called "wet" sugar beet districts and districts normally having a high water table, the production of sugar per acre can be increased, if a satisfactory seed bed can be obtained and beets planted as early in the season as possible.

Growers are urged to plan now on early cultural operations for next season's crop.

Spreckels Sugar Beet Bulletin

PUBLISHED FOR CALIFORNIA SUGAR BEET GROWERS BY THE SPRECKELS SUGAR COMPANY

Vol. VII NOVEMBER 1943 No. 11

SPREAD MANURE NOW FOR INCREASED CROP PRODUCTION

By R. D. JONES, *Livestock Specialist*
Spreckels Sugar Company

Previous articles in the Spreckels Sugar Beet Bulletin have shown why it is necessary to handle properly the manures produced on the farm in order to conserve and best utilize their fertilizer values.

With the approach of the fall weather and the completion of crop harvest, it is timely to give some thought to gathering and spreading manure accumulated from livestock feeding operations before the advent of fall rains. Spreading manure and discing the land before the first rains is considered the best method for conserving fertilizer values.

To assist beet growers to improve the fertility of their fields, the Spreckels Sugar Company each year makes available manure from the Swanston Feed Yards at Woodland. The Company has already stock-piled some 3,000 tons of manure and expects to secure an additional 3,000 tons now in the corrals. Growers desiring to obtain this material should contact their field superintendents. Arrangements have been made with a party to gather and load this manure in growers' trucks. For this service, a charge is made.

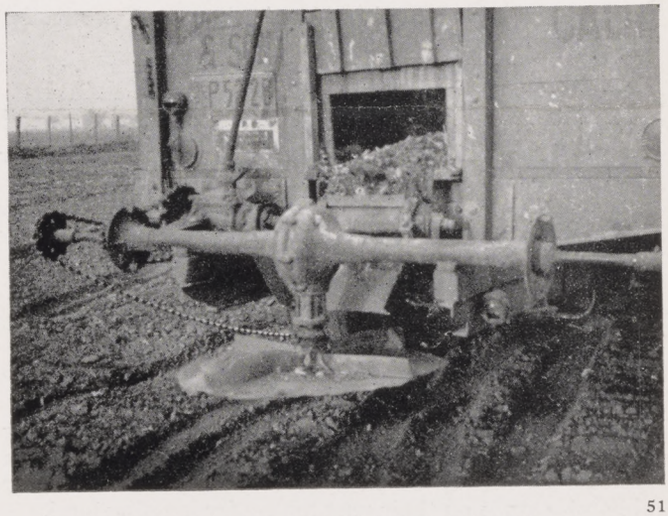
Several growers last fall hauled manure in their beet beds—dropped the sides and forked off the manure in windrows as the truck crossed the field. On completion of this method of spreading, the windrows were cross-harrowed or floated, resulting in a fairly even distribution over the surface of the land and at a relatively low cost.

There will no doubt be greater demands made on California farmers to produce more and more food. This cannot be done unless soil fertility is maintained. Of all fertilizers, barnyard manures have been the most consistent aid in producing greater yields of beets.

With inorganic commercial fertilizers difficult to obtain and high in cost, beet growers are urged to spread such manure as is available on their fields now.

50

Manure spreader with spinner distributor used extensively in the Salinas territory.



51

Detail of spinner attached to rear of truck.

LONG LEASES ADVISABLE

By CHAS. L. PIODA, *Resident Manager*
Spreckels Sugar Company

A farmer, who rents a ranch, is in effect the owner for the term of his lease. Subject to the conditions that may be prescribed in the lease, he is in a position to plan his operations in accordance with the physical condition and economic possibilities of the property.

A tenant who has the land for but one year will attempt to make it produce the largest revenue possible with the least amount of labor and investment in the form of permanent improvements on his part. On the other hand, if a farmer has land under his management for three years or more, he may be able to plan his crops and rotation so that larger returns can be obtained if certain improvements to the property are carried out.

IRRIGATION SYSTEM OF PRIME IMPORTANCE

The most important problem to be given consideration is the irrigation system, because most crops in beet growing areas must be irrigated. Then, the condition of the soil surface must be studied and a plan of irrigation and leveling laid out which will permit satisfactory furrow irrigation. Next is the fertilization and planning of the crop. Furthermore, the forward looking farmer should be in a position to make use of the by-products of the crops to feed his own livestock.

All this requires work and the investment of money. A tenant is not justified in investing substantial amounts of money in such improvements unless his use of the

(Continued on next page)

LONG LEASES (Continued from preceding page)

premises will permit him to regain the cost within the term of his lease.

It is true that in these times most ranches have irrigation water developed either from wells, sloughs, or streams, but the quantity may be insufficient to irrigate the crops properly. Also, the land may be so irregular that much water is wasted and portions of the crops drowned out in irrigation.

A man who has the land for one year only does not feel justified in installing additional facilities or leveling land, even though he may know that his crops will be greatly improved thereby. Nor does he feel that the landlord should profit by his efforts without bearing a part of the cost thereof. So it is usually the case that the tenant does the best he can with what is there and production suffers accordingly.

RESULTS JUSTIFY PROPER LEASING

How different it can be if a good farmer gets control of a tract of land for a period of three years or more. He will reason thus: This land has a sufficient supply of water, but because of waste due to lack of leveling, the crops suffer. If it is leveled, it will cost less to irrigate, will use less water and the crops will be greatly increased. Hence there will be three years of increased production to pay for the expenditure made to obtain this end.

If the lease is on a share basis, the landloard profits to the extent of his share in any increase of production obtained. If cash rent is paid, the profits derived from the work done are all retained by the tenant.

Not all landlords refuse to install or, at least, to participate in installing irrigation facilities that are permanent improvements to the property, but there is considerable reluctance on their part to pay for leveling land.

As a concrete example of what might be accomplished, let us take the case of a beet grower who has a tract of land, which, under conditions existing at the beginning of his lease, has a record of producing 12 to 13 tons to an acre. If he spends $10 per acre in leveling the land, increased production of 1 ton of beets per acre under present prices will more than reimburse him for his expenditures. Reasonable expectations of increase in yield and reduced growing costs should be considerably in excess of this minimum.

Obviously, no satisfactory solution of the problems of rotation and fertilization can be worked out until an irrigation system has been established that will most economically take care of the irrigation requirements of the ranch.

The improvement accomplished in the Salinas Valley in the last fifteen years is an outstanding example of what tenants can do if economic conditions justify the expenditures made. With an increased lettuce crop as the principal incentive, lands have been leveled, and pumps and pipelines installed on thousands of acres of land, which, although relatively even, have required varying amounts of surface work to be put in condition to produce maximum crops.

Farmer-owners, who have realized the value of such improvements, have done much of this work, but a very considerable portion has been accomplished through the efforts of tenants who were willing to expend the necessary money to improve the property because of long leases.

WELL SHAPED BEDS IMPORTANT

By GLEN McDOUGALL, *Agricultural Department*
Spreckels Sugar Company

Experience has taught us that after the fall crops have been harvested and before the winter rains set in, land should be made ready for the following year's crop.

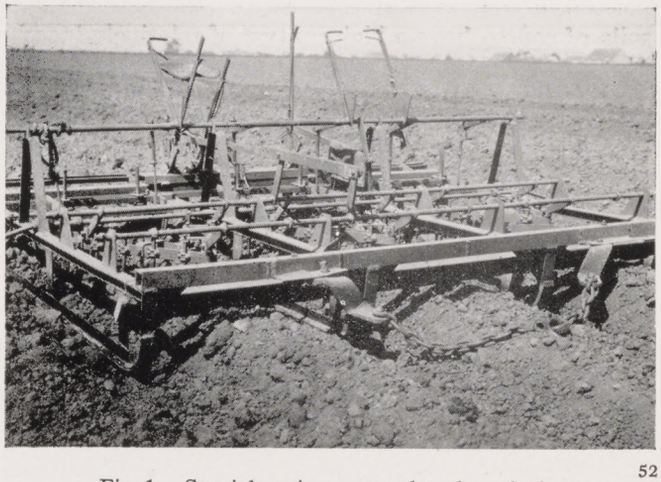
Dry land can be worked and necessary surface leveling done without causing any damage to the physical structure of the soil. Such operations as plowing, chiseling, discing, harrowing, and ridging are best done while the soil is dry or before heavy rains start.

Where ridge planting is practiced it is important that from the outset growers realize the necessity for properly spaced, well formed beds: Properly spaced, because (1) with the advent of mechanized harvesting, the distance between the bed centers must be uniform so that standard harvesting machines will not be handicapped by varying spacing of beds; and (2) so that all rows will be on top the beds and will not run off on the sides. Irregularities in both these features will cause difficulties with cultivation and breakage of beets in harvesting.

It is very important that the land be worked into good shape before the ridging operation begins. The last operations, before ridging, should be done in the opposite direction to the way the field is to be ridged in order to avoid being confused by the mark which may be left by the disc or harrow.

The usual practice is to make ridges from 40 to 42 inches from center to center. A good many growers like 42 inches, in that it gives them more room in the furrows for cultivating tools and tractor treads.

The ridges should be left with the centers high. This affords drainage during the rainy months and faster drying when the rains cease. This is especially true if the ridges are made with the slope of the land (providing the slope is not too great) and drainage ditches are provided at the end of the field to take away the surplus water. (Photograph 1.)



52

Fig. 1. Special equipment used to shape beds.

After the early rains, when the field is ready to plant, the ridges will be firm but not packed. If sufficient rain

to germinate the seed has not fallen by planting time, the field can be planted dry and then irrigated.

It is very important to have a good seed bed, especially when sheared seed is used, the usual method being to work the ridges down lightly several times with a light harrow or bed-shaper, which results in keeping a fine mulch on top of the bed. If beds are worked down too fast, they may become cloddy and rough on the surface.

53

Fig. 2. Ridges, if properly made, assist in providing correct drainage of a field.

Ridges should be worked down until they are 20 inches from shoulder to shoulder. This gives room to make rows 12 or 14 inches apart, leaving a 3 to 4 inch shoulder on which to cultivate. (Photograph 2.)

ORGANIC MATTER VITAL

By W. C. WATERMAN, *Agricultural Superintendent Spreckels Sugar Company*

Farm land is as rich or as poor as its content of organic matter. The content normally ranges from less than one per cent in sand to more than ten per cent in loams. Peat soils, of course, have a high content of relatively inactive material.

Humus is formed by the decomposition of organic substances in the soil. It improves the soil by promoting better aeration, improving its crumb structure, increasing its water-holding capacity, and it diminishes any tendencies toward wide fluctuations in alkalinity or acidity.

Continuous cultivation of a soil results in a gradual loss of humus. Investigations have shown that as a result of 60 years of farming, certain soils were found to have lost a third of their humus, the losses being greater during earlier years than during the later ones.

The common sources of organic matter to California agriculture can be divided into three groups:

1. Green cover crops, turned under as green manure, which decompose rapidly and leave relatively little humus in the soil. As stated by B. A. Madson, head of the Agronomy Division, University of California, Davis: "The actual addition of humus by one or even several cover crops may be infinitesimal, yet the effect on the physical condition may be very pronounced." (See Spreckels Sugar Beet Bul. Vol. V, page 102.)

2. Animal manures, which decompose fairly rapidly in the soil, but yield considerable amounts of humus.

3. Crop residues, such as bean straw, grain stubble, corn stubble (milo) and alfalfa sod which undergo more gradual decomposition and supply relatively large amounts of the more resistant type of humus in the soil.

LAND NEEDS ORGANIC MATTER

The return to the soil of tomato and bean vines, grain stubble, and the tops and roots of vegetables, will not maintain the organic matter supply of cultivated fields. Unless additional plant materials are added, the soil's organic matter supply gradually diminishes and crop yields decrease.

The return of crop residue is a move in the right direction. The use of cover crops is also highly desirable and cover crops plus crop residues are better than either alone. The fact remains, however, that additional organic matter is needed as obtained from the growing of alfalfa, farm manure, and turning under cover crops to restore the organic matter lost by growing cultivated crops on the land.

SAND AND CLAY SOILS CAN BE IMPROVED

Light sands and heavy clays have a greater need for organic matter than have the intermediate loam types of soil. By the addition of large amounts of organic matter, sands and clays can be transformed into soils that are quite similar to loams in their behavior.

The unproductiveness of sands is due in large part to their inability to retain water and plant nutrients. When well-rotted organic matter is added to such soils in large quantities they are able to absorb more water to sustain growth and they continue to supply the necessary nitrogen and mineral elements to crops over a longer period of time. However, all soils are benefited by organic matter and their productivity usually rises and falls depending upon whether the supply of organic matter which they contain is increased by manuring, alfalfa sod and cover crops, or is decreased by continued heavy cropping.

Animal manure is still the most effective source of organic matter known. It contains both plant nutrients and organic matter. A considerable portion, about 80%, of the plant nutrients removed in crops fed to livestock can be returned to the soil in the form of manure. The nutrients of manures are not all immediately available but are slowly liberated and are utilized by plants over a relatively long period of time. Under the livestock system of farming, about one-half of the dry matter that is produced on the land can be returned to the land in the form of manure.

It is probably inevitable that in order to maintain a satisfactory level of production per acre in highly intensified sugar beet producing areas all of the sugar beet tops and beet pulp will be converted to farm manure and returned to the land.

SOIL-BORNE BEET DISEASES

By E. A. SCHWING, *Entomologist*

Farm land is a capital investment. As a capital investment, it should be protected against encroachment of diseases which will cause depreciation in the value of the land. Soil borne organisms that cause disease are a major threat to the value of land which is normally used to grow crops susceptible to such diseases.

The major soil organisms that will be considered are the sugar beet nematode (Heterodera schachtii Schmidt), the garden nematode (Cacconema radicicola Cobb), and the southern root rot (Sclerotium rolfsii).

D. G. Milbraith of the State Department of Agriculture, in his article in the April 1942 issue of the Spreckels Beet Bulletin, pointed out that both nematodes and sclerotium are spread by man, and by infested plants set out by man.

These organisms have a number of common characteristics. They cannot move about from field to field until they are moved by the agency of man; they are practically impossible to eradicate once they are established; and they are extremely resistant to any effort made to destroy them.

The obvious method of control is prevention. Whatever money is spent on prevention is bound to be relatively cheap compared with any control method that would be employed later, when the organism has established itself. To prevent spreading it is imperative that all farming communities are fully informed of the location of these soil organisms. The office of the Agricultural Commissioner in each county is the clearing house for all such information and it is wise to keep in touch with that office.

The major threat of introduction of these soil organisms to any new locality resolves itself into a carrying of these organisms on soil that adheres to the *roots* of plants that have grown on infested soil, into a carrying of these organisms on soil that adheres to *machinery* that has passed over or through infested soil, or into a carrying of soil particles by *man* or *animal* from infested fields.

Other methods of spreading are in irrigation water which has been drained from infested fields and from seed to which some of these organisms may be attached.

No plants should be moved from infested fields to be transplanted to other fields unless such organisms are destroyed. This process is too expensive to be practical in most cases. In harvesting ripened root crops from infested fields, soil from such crops should be prevented from returning to a different portion of the same field (which portion may be clean) or to any other field. Machinery used in such fields should be cleaned thoroughly and disinfected with diesel oil or corrosive sublimate to kill any organisms left so that this machinery cannot infest new areas. Preferably, animals should be kept out of infested fields, but if they have been in such fields they should be watched carefully especially in wet weather, to prevent the spread of infestation. It must be remembered that man can carry soil particles on his shoes.

The best of intentions are not always enough, so other safeguards should be applied by the prudent landowner. Crop rotation is a very effective method of keeping down the population of these soil organisms. By following a logical crop sequence, it may be possible to prevent the increase of these organisms to such an extent that they will not be noticed.

If, in spite of all precautions, or if, in the case of neglect, these soil organisms do become established, crop rotation can be used as a control. It has been possible to raise excellent susceptible crops on these soils, in spite of the organisms, when the population has been kept at a minimum.

The beet nematode has a number of non-host plants which can be used to rotate with sugar beets. They are alfalfa, clover, beans, peas, potatoes, cereals, corn, tomatoes, onions, lettuce, and other truck crops. If the infestation is less than ten per cent, susceptible crops can be raised once in three years. If there is ten per cent or more infestation, the rotation must be lengthened to four or more years. Alfalfa should not be left for more than four years as the nematode becomes adapted to it by that time and may increase on alfalfa after that period of time.

Garden nematode has a more narrow range of non-hosts. These are barley, wheat, corn, grain, sorghums, and asparagus. Susceptible crops can be raised if they are grown in the winter months as the nematode is quite inactive at a temperature of 58° F. One crop in four years is the limit for plants susceptible to the nematode. Clean cultivation of moist soil helps to reduce numbers.

Sclerotium rolfsii has a large number of hosts. It is now possible, through the efforts of Dr. L. D. Leach, to take counts of the number of sclerotia in the soil and predict possible damage. Where less than five per cent crop damage is expected, sugar beets can be grown with safety. The degree of safety can be raised by using nitrogenous fertilizers and can be decreased by planting in an area where there is considerable seepage. The non-hosts that can be used to decrease the sclerotia population are wheat, barley, oats, alfalfa, asparagus, strawberry, and corn.

Soil borne organisms that cause beet diseases are so serious in their effect on land value that we cannot overemphasize the role of prevention. It behooves each community to act as a unit in an effort to keep out these pests and to prevent their spread. Once these soil organisms have become established it is then essential to reduce the damage to susceptible crops, by known rotation methods, and to prevent spread from these new centers of infestation.

GROWERS URGED TO STUDY HARVESTERS

By J. E. COKE, *General Agriculturist*

It is too early to make an accurate appraisal of the mechanical sugar beet harvesters that are operating this season. Many beet growers in the state are gaining experience by the use of one or more of the units now available. Many more have availed themselves of the opportunity to watch some of the units working in various beet fields.

While there are many problems yet to be worked out, the fact that commercial acreages of sugar beets are being harvested mechanically is encouraging. It is hoped that all beet growers will make an attempt to study carefully the various units so they may make their own determination as to the possibilities of the various types of equipment.

Most of the 35 Marion harvesters which were manufactured this year are now harvesting beets in the Sacramento-San Joaquin deltas.

In most districts there are in operation in various fields several of the plows, toppers or cross conveyors made available by the Spreckels Sugar Company. Growers desiring to see these various machines operating may contact their field superintendent to determine the location of the units in which they are interested.

The Spreckels Sugar Company is making a critical study of the operation of these units and will be glad to provide such information and data as it is able to obtain to those growers who are interested in securing or developing beet harvesting machinery for 1944.

NEW BEET STATEMENT EXPLAINED

GROWER'S STATEMENT OF ACCOUNT FOR 1943 BEETS DELIVERED

By B. E. BROWN, *Office Superintendent*
Sacramento District Office, Spreckels Sugar Company

(EDITOR'S NOTE: Mr. Brown has directed this article to the growers. Landowners who lease their land on a share rental basis and, therefore, get a copy of a grower's statement will notice that the explanations cover information that is not included on their copy. We have merely eliminated from the landowner's statement, information concerning financing arrangements between grower and the company).

* * *

As you growers have noticed, the Company has adopted a new form this year as a statement of your account for beets delivered, a reproduction of which appears in this bulletin. While this form is considered to be more or less self-explanatory, perhaps some clarification and description of the form is in order. You will notice that letters (A, B, C, etc.) have been inserted in certain columns and lines in the form. This has been done to help you follow the comments, included in this article, concerning the figures which appear in the reports you receive.

The figures inserted in the columns labeled A, B, C, and D are copied from the record of your deliveries, which record will always be attached to this form. These figures will be the totals for your deliveries for the entire season up to the date appearing at the top of the form. When, for any reason, you have delivered beets to more than one receiving station, you will find a separate delivery record for each station to which you have delivered, and the amounts in columns A, B, C, and D will be copies by receiving station.

The rate inserted in column E is your proportionate share of the cost per ton of beets of hauling dirt away from the receiving station. This rate is one-half the cost of hauling the dirt, but in no event is it to exceed 3c per ton of beets. The rate being inserted at the present time is an estimated one and an adjustment will be made with you as soon as the actual costs are determined.

The amount shown in column F is determined by multiplying the first net tons as shown in column A by the rate shown in column E.

In column G is inserted the rate per ton of allowance to you for Hauling and Loading, as provided in paragraph 7 of your sugar beet contract. This rate is the sum of the 15c and the mileage allowance of 2½c per mile from your field to the loading station as determined by you and the Field Superintendent in your district.

The amount shown in column H is determined by multiplying the first net tons as shown in column A by the rate shown in column G.

The items I and J are determined by dividing the totals of columns B and C by the total number of loads as shown in column D.

Item K, tons of clean beets to date, is found by two computations: first, multiply the first net tons (column A) by item I, and then deduct this result from the first net tons.

The rates shown on lines 1 and 4, column L are in accordance with the table of payments in the sugar beet contract based on the average sugar per cent of your beets as shown by item J. Of course, the sugar percentages as given in the sugar beet contract are in even percentages only and item J will always be carried to two decimal places. Therefore, it has been necessary for the Company offices to expand the table to provide the rates for each one-hundredth of a per cent. In order to show how this is done, assume that your sugar percentage is 16.45, and you wish to find the base price to which you are entitled. Since the sugar percentage is between 16% and 17%, first find the difference in price per ton on 16% and 17% beets, or $6.785 minus $6.317 which is $0.468. This $0.468 is the value of that 1% between 16% and 17%. Since your beets tested 16.45% you want to find 45/100 of this $0.468 so it can be added to the price for 16% beets. To do this, first divide $0.468 by 100, which produces $0.00468, and then multiply this figure by 45, which produces $0.2106. Then add this $0.2106 to $6.317, the price for 16% beets, and you have $6.5276 which is the base price per ton for beets testing 16.45%. The rate per ton for the Government Support Payment can be determined by the same procedure.

The rate on line 2, column L is taken from paragraph 6 of the sugar beet contract.

The rate on line 3, column L is in accordance with the letter sent to you by the Company dated April 6, 1943, which announced an additional incentive payment to those growers who deliver their beets in accordance with a harvest program provided by the Company. This payment will appear only on your last statement for the season.

The figures that appear on lines 1, 2, 3 and 4, under col-

1500 Aug 7-43 (24504)

SPRECKELS SUGAR COMPANY
Sacramento, California

Statement of Account for 1943 Beets Delivered to _____

GROWER _____
LANDOWNER _____ Contract No. _____

LOADING STATION	FIRST NET TONS TO DATE	TOTAL TARE % TO DATE	TOTAL SUGAR % TO DATE	NUMBER LOADS TO DATE	DIRT HAUL CHGE. TO DATE RATE	DIRT HAUL CHGE. TO DATE AMOUNT	HAUL AND LOAD ALLOWANCE TO DATE RATE	HAUL AND LOAD ALLOWANCE TO DATE AMOUNT
	A	B	C	D	E	F	G	H
Totals								
Average to Date		I	J					
Clean Beets—Tons to Date	K							

		PRICE PER TON	AMOUNT TO DATE	AMOUNT PREVIOUS	BALANCE THIS MONTH	SHARE RENT %	GROWER SHARE
1	Base Price	L	M	N	O	P	Q
2	First Incentive Pymt.						
3	Second Incentive Pymt.						
	Total						
4	Support Payment						
	Total						
5	Less Dirt Haul						
	Net						
6	Haul & Load Allow.						
7	Total						

	COMPANY CHARGES			Less Company Charges 15	
8	Balance Previous Statement	R		Paid for Account of Grower 16	
9	Balance from Cont. No.			Order No. Paid to:	
10	Advances to				
11	Interest				
12	Pulp				
13	Labor Charges				
14	Rent				
				Total Charges 17	
				Check for Balance 18	
	Total			Balance Due Company 19	

(Continued on next page)

GROWERS' STATEMENT *(Continued from preceding page)*

umn M are determined by multiplying tons of clean beets, item K, by the respective rates shown in column L. They are the values of your beets delivered for the entire season up to the date shown at the top of the form. The amounts shown for lines 5 and 6, column M, are the totals carried down from columns F and H.

The amounts shown for lines 1 to 6, column N, are the same amounts which were shown in column M on the statement of your deliveries for the previous month. Naturally, the report covering your first month's deliveries will not have amounts in column N.

The figures in column O will be the difference between columns M and N.

Column P will be filled in only for you growers who are leasing land on a share crop basis and will be based on the share per cent you have authorized in your sugar beet contract to be paid to your landowner. If your share rent is 25%, the amounts in column P will be 25% or ¼ of the amount in column O.

The amounts in column Q will be the difference between column O and P, and the figure appearing on line 7, column Q, will be the final net figure to be credited to your account for the months deliveries.

Some time before the harvest season started, you all were sent a statement showing the amount of charges against you for seed, implements, advances, etc. When you receive the first statement of account for beets delivered, the amount of that statement sent you earlier is the amount that will appear on line 8, column R.

The amount for line 10, column R, will be the sum of amounts advanced to you growers being financed by the Company since the last statement was submitted, and the date of the last advance included in this amount is indicated.

The amounts for lines 11 to 14 will be any charges made against you since the last statement submitted to you for the various items as listed.

The total of column R is then transferred to line 15, column Q.

Under line 16, column Q, are listed amounts being paid to others for your account in accordance with instructions received from you in the form of orders or assignments, including payments to the Central California Beet Growers Association.

Line 17 will be the total of the amounts under lines 15 and 16. If the amount on line 17 is less than the amount on line 7, the difference is shown on line 18 and a check is sent to you for it. If it is more than the amount on line 7, the difference is shown on line 19.

You may have noticed that line 9, column R, was skipped but that now will be explained. It will affect only those of you who have more than one contract and, generally, are being financed by the Company. For those of you in this position, the Company groups the advances made to you on the several contracts in one account. Therefore, since the statement of account for your deliveries are made by the individual contracts, in the preparation of the statements, the total amount of advances made to you are applied against the first contract report prepared. If the proceeds from that particular contract do not satisfy the total charges against you, the report for that contract will show an amount in line 19, "Balance due Company." This amount is then carried forward to line 9, column R, for the next contract report being prepared. This procedure is repeated until the proceeds from your various contracts equal the amount that has been advanced to you, after which a check is sent you for any balance due you.

It is hoped that these explanations may enable you to better understand the reports being submitted to you covering your beet deliveries to the Company. However, if there are questions in your mind, you are always free to contact either the Field Superintendent in your district or the Office Superintendent of the Agricultural Department, either of whom will be glad to go over the report with you.

WAR LOAN DRIVE AD EFFECTIVE

UNITED STATES TREASURY
WAR FINANCE COMMITTEE
Twelfth Federal Reserve District

WAR SAVINGS STAFF — VICTORY FUND COMMITTEE

FEDERAL RESERVE BANK OF SAN FRANCISCO
400 SANSOME STREET
SAN FRANCISCO

May 13, 1943

Mr. F. J. Belcher, President,
Spreckels Sugar Company,
2 Pine Street,
San Francisco, California

Dear Mr. Belcher:

Out of all the wonderful advertisements dedicated to the Second War Loan Drive, Mr. William A. Day, chairman of this committee, and myself, agreed that the one sponsored by you, captioned, "I saw the Japs parade up Main Street", was the most startling and effective of all.

This came to our attention in both the Gilroy and Salinas papers and we could not resist the temptation to tell you how much we appreciated your help in general, and this advertisement in particular.

Yours very truly,

Arnold Gruniger Jr.
Executive Manager.

"I SAW THE JAPS PARADE UP MAIN STREET"

Spreckels SUGAR BEET Bulletin

PUBLISHED FOR CALIFORNIA SUGAR BEET GROWERS BY THE SPRECKELS SUGAR COMPANY

Vol. VII DECEMBER 1943 No. 12

CLIMATE, FARMING PRACTICES, AND YIELDS

A DISCUSSION OF SUGAR BEET PRODUCTION IN COASTAL AND INTERIOR AREAS OF CALIFORNIA

By G. P. WRIGHT, *District Manager*
Spreckels Sugar Company, Spreckels

Editor's Note: G. P. Wright, the author of this article, is in an excellent position to compare beet farming operations in the Sacramento-San Joaquin Valleys with those in the Coastal area adjacent to Salinas. For eighteen years Mr. Wright supervised agricultural operations for the Spreckels Sugar Company in the Sacramento area and for the last year and a half has been District Manager in the Salinas area.

There are two definite land areas, which contribute to the annual supply of sugar beets processed each season by Spreckels Sugar Company. These areas may be defined roughly as the Coastal, from Gilroy on the north through the San Benito, Pajaro, and Salinas Valleys, to King City on the south, and the Interior, which includes the Sacramento and San Joaquin Valleys from Colusa as the north boundary to Firebaugh on the south.

These two areas include a large part of the central California agricultural lands and there is a wide range of climate, rainfall, and soil types within each area. Summer temperatures in the interior range from extreme heat at the north and south to a mild temperature in the island area south and southwest of Sacramento. Summer temperatures in the coastal area range from quite warm in the north and south, to a cool, mild temperature in the Watsonville and Salinas districts, with considerable summer fogs.

The annual rainfall within the two areas varies in a manner similar to temperature, the seasonal rainfall at Colusa being very much greater than at Firebaugh. In the coastal area the rainfall is much heavier in the Gilroy-Watsonville districts than at King City. Watsonville and Grimes would be quite comparable in seasonal rainfall for maximum and King City and Firebaugh for minimum. Central points may be taken in each of the producing areas for a comparison of rainfall.

Such a comparison for Sacramento and Salinas would definitely indicate that there is not sufficient difference to be a factor in per acre production of sugar beets. The following tabulation is a composite of the monthly average rainfall readings over a 40-year period for Sacramento and Salinas.

	Jan.	Feb.	Mar.	Apr.	May	June
Sacramento	3.31	3.08	2.41	1.04	.54	.16
Salinas	3.01	2.33	2.22	.89	.45	.10

	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
Sacramento	.00	.00	.30	.80	1.55	2.69	15.88
Salinas	.02	.03	.29	.43	1.18	2.42	13.37

From the above official rainfall record it is rather obvious that the rainfall for the two areas is so nearly equal that this should not result in any significant difference in yield per acre, particularly as rainfall can be supplemented by irrigation in all areas.

There is the usual wide variety of soil types within each area. The types range from the fine sandy loams, through the loams and clay loams, to the heavy clay adobes. The average soil used for sugar beet production in the coastal area is of a heavier type, more difficult to work properly than most of that used in the interior.

55

The center strip of unfertilized beets in the above picture illustrates the importance of the use of fertilizer in the Salinas Valley.

During periods of normal precipitation there is no definite shortage of irrigation water in the coastal area; however, the supply is more abundant in the interior. The water supply in the coastal district is very largely limited to wells, while in the interior large areas are irrigated from canal and reservoir systems by direct pumping from rivers and streams. The average output of water from irrigation pumps in the interior is greater than in the coastal area.

The above comparison of climate, rainfall, soil types and water supply indicates that the difference is insufficient between the two areas to account for the difference in yield of beets. This is verified by the fact that some acreage in the interior almost every year produces yields equal to top yields in the coastal district. Following are some examples of yields produced in the interior area, which compare favorably with top yields in the coastal area: A field of 190 acres, located near Davis, produced 41 tons per acre. A Grimes grower averaged 22 tons per acre on a 1,000 acre tract. East of Davis, 36 tons per acre were produced on 68 acres of land. South of Woodland, 37 tons per acre were produced on 70 acres. There was a 24 ton acre production on 60 acres at Firebaugh.

These high yields were not selected from any particular district, neither were they produced in any one year. They were produced on widely separated lands within the growing area and over a period of years. The reasons for the high yields were: (a) Naturally favorable soil conditions, (b) perfect soil aeration so that plant food in the soil was available to the plants at all times, (c) excellent

(Continued on page 58)

BEET SUGAR PRODUCTION FROM CHEMICAL FORMS OF NITROGEN (1)

By ALBERT ULRICH, *Division of Plant Nutrition*
University of California

There are many forms of chemical nitrogen available to the grower for application as a fertilizer to sugar beets. Each form has desirable chemical and physical properties which make it more suitable for use under a given set of conditions than another form of nitrogen. Since there are major differences in the properties of the nitrogen sources, perhaps their different characteristics might also influence the yields and sugar percentages of the beets. It is with this possibility in view that a series of pot experiments were undertaken to determine the influence of a constant amount of nitrogen on beet sugar production.

The chemical sources of nitrogen studied over a six-year period were anhydrous ammonia, calcium nitrate, calcium cyanamide, ammonium nitrate, urea, ammonium sulfate and sodium nitrate. All of the trials were conducted in 33-gallon pots with Metz silty clay loam, a calcareous soil obtained from King City. Each pot was fertilized with 0.56 grams of nitrogen each year just after thinning, except that calcium cyanamide was added approximately thirty days prior to planting, and anhydrous ammonia was applied in six to seven increments starting at thinning time and ending in mid-July. The beets were harvested each year in late September or early October and at that time all the beets had utilized completely the nitrogen applied as indicated by the dormant condition of the beets. The beets were weighed and then analyzed for sugar on the following day.

The beet yields, sugar percentages and sugar produced from six replications of each treatment are given in the accompanying figure. The results indicate that the yields for each source of nitrogen for every year are definitely higher than the corresponding pots that did not receive nitrogen. Also, the yields from all the pots decreased markedly during the first three years, but in the fifth and sixth years there were no large changes from the preceding year. The yields from the various nitrogenous fertilizers did not differ greatly from each other, although in some years significantly lower yields were obtained from the applications of anhydrous ammonia, calcium cyanamide and calcium nitrate than from the additions of ammonium nitrate, urea, ammonium sulfate or from sodium nitrate. Some possible causes for the lower yields from the first group of materials are a partial volatilization of the ammonia from the anhydrous ammonia in the irrigation water, a toxicity of the cyanamide of the calcium cyanamide and a leaching of the nitrates from calcium nitrate. When these materials were applied correctly, or added under favorable conditions, none of the adverse effects occurred. The effects on the sugar percentages throughout the six-year period were without significance except in 1940 when the untreated beets were lower in sugar than many of the nitrogen-treated beets.

The influences which the form of nitrogen would have on sugar yields in the field cannot be definitely stated from the present data, but the results of the pot experiments are of interest as they indicate what might occur under field conditions on soils well supplied with lime.

(1) Experiments were conducted by the University of California in co-operation with the Spreckels Sugar Company.

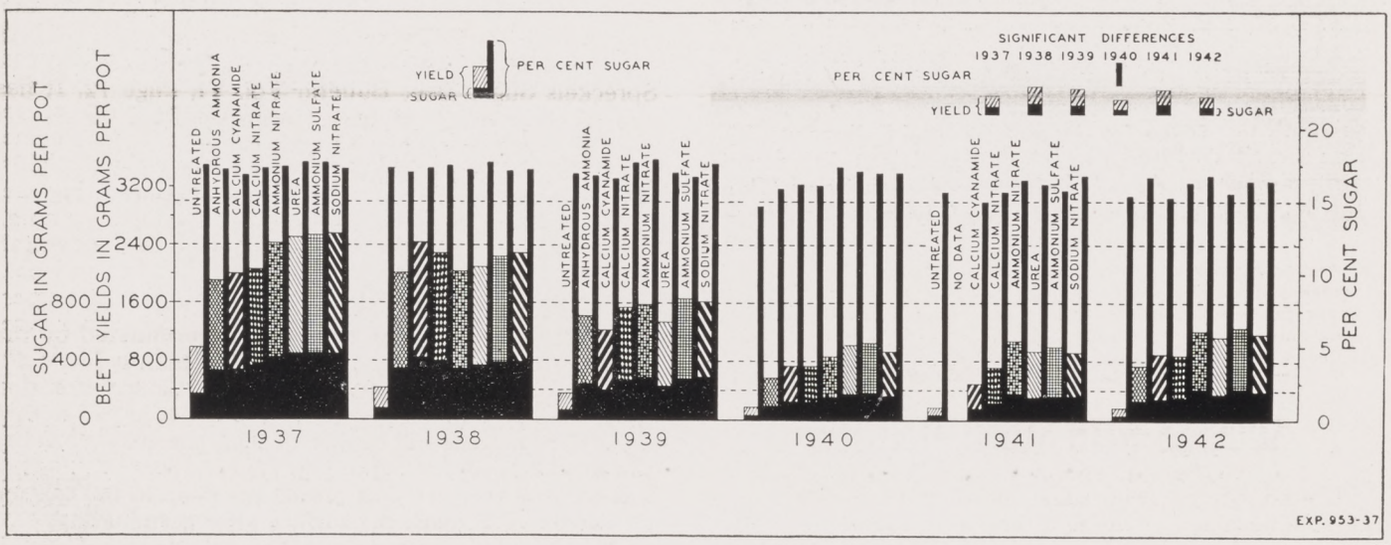
STORAGE AND CARE OF EQUIPMENT

By H. T. CARLSON, *Assistant Agricultural Superintendent*
Spreckels Sugar Company

With the rationing of farm machinery and the delay in getting repair parts, it is now more important than ever to care for equipment properly.

As soon as each seasonal field operation is completed, the equipment should be gone over carefully and worn or broken parts repaired before storing. If mechanical harvesting equipment is to be used, it is essential to have uniform rows; therefore, seeders should be checked for accurate row spacing. Any new parts needed should be ordered at once so the delay in obtaining them will not interfere with the general farm work.

Weather conditions often allow only a short space of time for planting and cultivating sugar beets so it is highly important that seeders and cultivators are in excellent working condition.



56

Yields, sugar percentages and sugar produced by sugar beets grown in pots of Metz silty clay loam, fertilized each year with the same amount of nitrogen derived from anhydrous ammonia (added as very dilute ammonium hydroxide), calcium cyanamide, calcium nitrate, ammonium nitrate, urea, ammonium sulfate and sodium nitrate. In the diagram the tall, narrow, black bar represents the percentage sugar; the short, broad, black bar to the left indicates the total sugar produced; and the broad, black bar plus the bar immediately above gives the beet yield.

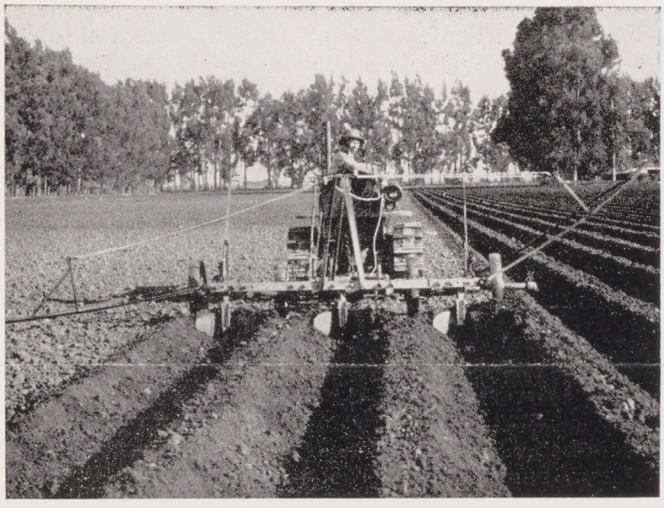
GOOD SEED BEDS IMPORTANT

By HUGH F. MELVIN, *District Manager, Sacramento District*

Land preparation, in general, can be divided into two groups—operations that loosen the soil and those that compact the soil structure. These results may be accomplished in various ways. The fall is generally considered the best time for deep tillage, which should be done before the soil becomes wet from the heavy fall rains.

In some areas planting will commence very soon, weather permitting. Growers who were able to complete the preparatory work in the fall have only the final seed bed work to finish before planting. Since soils vary so greatly, no definite rule or farming practice can be set up as the proper procedure to follow. The important thing is to produce a satisfactory seed bed that is deep, fine, level and firm. The amount of work necessary to produce the desired soil condition depends on its original texture. Careful consideration should be given to the best method of tillage to employ. Our Field Superintendent in each district will gladly consult with you regarding these problems.

If conditions have prevented fall work, excellent results have been obtained by doing this preparatory work in the spring. There are usually more problems to be encountered, however. It is important that attention be given to proper drainage during the rainy season so that spring work and finally the planting of the seed will not be delayed longer than is absolutely necessary. Seed beds should be prepared in the spring with the idea of retaining sufficient moisture to germinate the seed and to carry the young plants until additional water is applied.



57

Method of preparing ridges in the Salinas Valley. The lister (or ridger) forms 2½ ridges on each trip across the field and the operator must exercise extreme care in completing the remaining half of the ridge formed on the last trip. This is accomplished by watching carefully the marks left by the indicator shown on each side of the ridger illustrated above.

SUCCESS WITH SEGMENTED SEED

By CHAS. L. PIODA, *Resident Manager*

United States beet sugar production in 1943 was notable because, for the first time in its history, a considerable proportion of the acreage devoted to the production of sugar beets was planted with segmented seed. Although growers had little or no experience with this type of seed, they adopted it on the basis of the successful results obtained from experimental plantings made by Roy Bainer, Associate Agricultural Engineer, University of California, at Davis, during 1941 and 1942, and from numerous small field plantings made in the beet areas of the United States in 1942.

The results now being obtained justify the growers' faith in the practicability of segmented seed, and now that the harvest in some sections is drawing to a close, approximate data are available upon which to base a comparison of performance of segmented and whole seed.

The Salinas area of the Spreckels Sugar Company is one such area and a comparison of sugar per acre produced during the last four years follows:

	1940	1941	1942	1943
Tons beets per acre	18.84	17.42	15.16	18.49
Sugar per cent	17.96	17.72	17.65	18.49
Pounds per acre sugar	6768	6176	5509	6838

Little or no segmented seed was used prior to 1943, and while 1942 was an abnormal beet year, the tabulation shows that the 1943 yield of sugar per acre from beets planted largely with segmented seed will be greater than in either 1940 or 1941.

Another planting season will soon be on us and a few reminders regarding the use of segmented seed gained from experiments and experience this year may not be amiss.

With regard to the seed itself: In every case where there is danger of seedling diseases, it should be treated with 2% Ceresan at the rate of 1½ lbs. per 100 lbs. of seed. (See Sugar Beet Bul. Vol. VII, Page 7.) After treatment it should be stored in a dry place and planted as soon as is reasonably possible. If held too long after treatment, especially in damp weather, the germination will deteriorate.

The rate of seeding should be determined by the grower on the basis of whether the beets are to be mechanically blocked or cross-cultivated, or thinned by hand as has been the general practice heretofore. It must be remembered that a pound of segmented seed contains approximately twice as many seed balls as whole seed. The amount of seed planted per acre depends also on the condition of the seed bed. The maximum used should not exceed six pounds of seed per acre, decreasing the amount to as low as 2½ lbs. per acre when the seed bed is ideal and it is the intention to handle the thinning work with long handled hoes. Photographs showing stands obtained from varying rates of planting will be found in the Spreckels Sugar Beet Bulletin Vol. VI, Page 72. It has been found that the ability of seedlings from segmented seed to reach the surface of the ground decreases as the depth of planting is increased. This was pointed out by Mr. Chas. Price, Associate Agronomist of the U. S. Department of Agriculture, as the result of experiments made by him earlier this year. (See Sugar Beet Bul. Vol. VII, P. 17.)

With this in mind, where seed is planted early in dry soil with the expectation of having it germinated by the rain, it is advisable to put it no deeper than is just sufficient to cover it. For later planting, particular attention should be given to the preparation of the seed bed so that the seed in no case will be deeper than one inch below the surface. Much of the replanting of sheared seed last spring was because the seed was placed too deep in the soil for the seedlings to reach the surface after germinating.

Planting should be done with a single drop seeder. Existing planters have been modified to do this work, and while results obtained from the modified planters are not all that could be desired, with care a satisfactory job can be done. In bed planting it aids to have straight and well formed beds.

CLIMATE AND FARMING (Continued from page 55)

penetration of irrigation waters, and (d) good drainage conditions, all of which are ideal for the sugar beet crop.

A comparison of the five year average yield of beets in tons per acre shows the coastal area (17.97 tons) to be significantly higher than in the interior (13.92 tons). This difference of 4.05 tons per acre, at the present price of sugar beets, would increase the interior grower's per acre income, if he could secure the higher yield, by approximately $48.60, enough to pay a considerable part of the cost of producing an acre of beets.

The difference of 4.05 tons per acre in yield for this five-year period can be accounted for by an analysis of only those farming methods, which are followed by coastal area growers, which, on the whole, are superior to farming practices in the interior.

1. USE OF FERTILIZERS AND COVER CROPS: Growers apply fertilizer very early in the season. They apply fertilizer to increase yields and not in relation to being able to collect benefit payments by meeting the requirements of the Sugar Act of 1937. It is not uncommon for a grower to apply 500 to 700 pounds per acre of a commercial nitrogenous fertilizer. Commercial fertilizer is placed in the soil at a depth great enough to reach the plant roots. Extensive use is also made of manure and cover crops. During the summer, manure is hauled by truck from distant points and piled in fields for land application the following year. Many growers prepare huge compost piles for use on their sugar beet lands. Gypsum and lime are used abundantly on heavy lands to make them more friable and to promote soil aeration. The growers use every available means of adding to their land those elements essential to maximum yields.

II. RIDGE PLANTING: There can be no question about the connection between ridge planting and increased yields. This type of planting materially increases soil aeration during the early stages of plant growth. Ridge planting permits earlier seeding of beets. Flooding or excessive wetting of crowns and foliage during irrigation is reduced to the minimum. Water penetration can be forced because of accurate control of irrigation water. Light or heavy applications of water can be made as required. Because of the better aeration, plant food and applied fertilizer can be used more readily by the growing crop. Growers need not be concerned with the natural soil moisture to secure stands of beets. Lands can be prepared and planted dry and the seed germinated cheaply and effectively by irrigation. Ridge planting reduces irrigation costs because there is no waste of expensive irrigation water and the amount of water applied can be determined accurately. Ridge planting produces a longer and better shaped beet which increases yields. Fields seeded early can be more easily drained in the event of heavy rainfall, so there is no standing water on small beets. Smaller seeding units are used for ridge planting, which allows more accurate seeding and makes large headlands unnecessary. It is a significant fact that of the two highest producing areas in the state for the 1943 crop, the Imperial Valley and Salinas, use ridge planting on more than 98 per cent of the sugar beet acreage.

58

Land plane—note that the bowl is pushing about one-third full of dirt. This is the correct way a plane should operate.

III. LAND PREPARATION: Wet land cannot be listed or ridged successfully, therefore lands are prepared for listing in the fall before the rainy season. This dry working of land is an important factor in increasing yields. Plowing is done with heavy, well constructed equipment capable of dry plowing the heavy clay lands in the coastal area to a depth of 11 or 12 inches.

59

Large heavy duty chisel or land cultivator used for land preparation prior to listing; Salinas District.

Following the plowing, growers perform a land operation which is a contributing factor to high yields. That operation is chiseling or dry land cultivation. The implement used is a very heavy framed tool equipped with heavy standards and chisel points. The standards are spaced 8 to 10 inches apart on the frame. These implements are capable of reaching a depth of 14 to 15 inches. The importance of dry-land cultivation is the breaking up of the soil below the depth of plowing. This not only provides a rough land condition, but, most important, loosens the subsoil and promotes aeration of the soil. Chiseling is done in two directions, the second being at right angles to the first.

Following some dry land discing and harrowing, some type of land plane is used. The planting is also done in two directions, the second at right angles to the first. The use of the land plane fills in the many small depressions in the land and is a real benefit to sugar beet irrigation. The importance of planing and leveling of lands used for sugar beet growing cannot be over-estimated as methods of obtaining more economic use of irrigation water and increases in yield.

There is no question regarding the ability of the grower in any district to adopt the above described farming methods, which are and have been common practice in the coastal area. These methods will definitely increase yields and decrease growing costs. They will also improve the physical condition of the soil for crops following sugar beets.

Spreckels SUGAR BEET Bulletin

PUBLISHED FOR CALIFORNIA SUGAR BEET GROWERS BY THE SPRECKELS SUGAR COMPANY

1943 INDEX

(Continued on reverse side)

SPRECKELS SUGAR COMPANY SCHEDULE OF BEET PAYMENTS

DOLLARS PER TON 1943 CROP

(Payments upon intermediate sugar prices and sugar content, or sugar prices or sugar content higher or lower than those shown in the following schedule, shall be on the same proportionate basis.)

Average Net Selling Price for Sugar Per Pound (Cents)	PER CENT SUGAR IN BEETS					
	14	15	16	17	18	19
3.00	3.500	3.825	4.160	4.505	4.860	5.225
3.25	3.850	4.200	4.560	4.930	5.310	5.700
3.50	4.200	4.575	4.960	5.355	5.760	6.175
3.75	4.550	4.950	5.360	5.780	6.210	6.650
4.00	4.900	5.325	5.760	6.205	6.660	7.125
4.25	5.373	5.831	6.300	6.779	7.268	7.766
4.50	6.003	6.506	7.020	7.544	8.078	8.621
4.75	6.633	7.181	7.740	8.309	8.888	9.476
4.98	7.213	7.802	8.402	9.013	9.633	10.263
5.00	7.238	7.829	8.431	9.044	9.665	10.297
5.25	7.553	8.167	8.791	9.427	10.070	10.725

IN ONE ACRE THERE ARE:

1. 43,560 square feet.
2. 26,136 running feet of row, spaced 20 inches apart.
3. 26,136 beets in rows spaced 20 inches apart and beets thinned to 12 inches (26,136 beets of 1 pound average weight equal 13.0680 tons per acre).
4. 31,363 beets or 15.68 tons of 1-pound beets in 1 acre planted an average of 20 inches apart and thinned 10 inches apart.
5. 39,204 beets or 19.60 tons of 1-pound beets in 1 acre planted an average of 20 inches apart and thinned 8 inches apart.

CROP RECORD 1943

FIELD No. OR NAME	ACRES PLANTED	ACRES THINNED	ACRES HARVESTED	TONS PER ACRE	SUGAR PER CENT	ESTIMATED PAYMENT N.S.P.	ADDITIONAL PAYMENTS